FRY'S PURE CONCENTRATED COCOA.

THE PRACTICAL TEACHER

Glen Lyon and Kenmore
(From Messrs. Ward, Lock, & Co.'s Guide-Books)

OUR JULY HOLIDAY NUMBER

	PAGE
EDUCATION IN PARLIAMENT	1
BY MANY HANDS	3
N.U.T. NOTES	3
NOTES FROM THE NORTH	5
THE ECONOMY OF FOOLS	5
THE TEACHING OF DOMESTIC SCIENCE IN THE UNITED STATES—I.	7
A GERMAN SOLUTION OF AN EDUCATIONAL PROBLEM. By W. T. Thompson B. A.,	8
RELIEF OF UNDERFED CHILDREN	11
EDUCATION IN SOUTH AFRICA—III.	13
FRENCH PRIZE COMPETITION	15
MATRICULATION EXAMINATION IN FRENCH FOR UNIVERSITY OF LONDON	16
REGULATIONS FOR CONTINUATION CLASSES	16
PRACTICAL TRIPS FOR PRACTICAL TEACHERS	17
SOME CITIES ON THE WAY TO AND FROM THE LIÈGE EXHIBITION	20
A SUMMER MEETING IN HOLLAND	23
A SEE-HOLIDAY	23
THE GAMES COURSE AT NÄÄS	27
NATURE NOTES FOR THE MONTH	28
NOTES OF LESSONS ON THE GNAT	30
NOTES ON AN EXPERIMENTAL COURSE OF LESSONS ON AIR AND WATER. By E. J. Russell	32
OUR ILLUSTRATED GEOGRAPHICAL NOTE-BOOK	33
THE HARMSWORTH ENCYCLOPÆDIA PRIZE COMPETITION: AWARDS IN FIRST SERIES	36
SUGGESTIONS IN CONNECTION WITH THE CORRELATED SCHEME OF WORK FOR AN INFANTS' SCHOOL	37
SCHOOL GARDENING FOR LITTLE CHILDREN	41
OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE. By A. T. Flux	44
OUR CERTIFICATE COURSE FOR 1906. By George Collar	46
CHEMISTRY. By C. A. West	51
PHYSIOGRAPHY	52
THEORETICAL MECHANICS. By Frank Castle	53
OUR QUERY COLUMN	54
THE EDITOR'S TABLE	55

·VOL· XXVI Nº 1

EDITORIAL, PUBLISHING AND ADVERTISING OFFICES OF "THE PRACTICAL TEACHER"
T. NELSON & SONS, 35 and 36 Paternoster Row, London, E.C.
EDINBURGH, DUBLIN, and NEW YORK

PRICE 6D.

For COOK'S VACATION TOURS, SEE BACK PAGE OF COVER

BLACKWOOD & SONS' NEW EDUCATIONAL WORKS.

A NEW SERIES OF READERS.

THE STORY OF THE WORLD. In Five Books. By M. B. Synge, Author of "Stories from European History," etc., etc. Coloured Frontispiece, numerous Illustrations and Maps. Book I.—On the Shores of the Great Sea, 1s. 4d. Book II.—The Discovery of New Worlds, 1s. 6d. Book III.—The Awakening of Europe, 1s. 6d. Book IV.—The Struggle for Sea Power, 1s. 9d. Book V.—Growth of the British Empire, 2s. **(Prize Edition),** (complete in two volumes, 3s. 6d. net each).

Uniform with the Above.

THE WORLD'S CHILDHOOD. In Two Books. Suitable for Standards I. and II. Fully illustrated. Price 10d. each.

Blackwood's Literature Readers.

Edited by John Adams, M.A., B.Sc., F.C.P., Professor of Education in the University of London.

Book I., 228 pages, price 1s. Book II., 275 pages, price 1s. 4d.
Book III., 303 pages, price 1s. 6d. Book IV., 382 pages, price 1s. 6d.

JUST PUBLISHED.

Byron—Selections. By Professor Wight-Duff, M.A. 3s. 6d.
Stormonth's English Dictionary. Pronouncing, Etymological, and Explanatory. An entirely new edition. Re-edited and Re-set.
I. School and College Edition. Crown 8vo, 1100 pages, 5s. net.
II. Handy School Edition. 16mo, 1s.
Educational News.—"Possesses, in copious selection of words, and keenness as well as clearness of definition, high worth—as a concise, accurate, and full treasury of the most useful vocables in the English language."
A German Reader for Technical Schools. By E. F. Seckler. 2s.

A History of English Literature. By J. Logie Robertson, M.A. 3s.
Outlines of English Literature. By the same. 1s. 6d.
Paraphrasing, Analysis, and Correction of Sentences. By D. M. J. James, M.A. 1s. Also in Two Parts, 6d. each.
The School Anthology (Chaucer to the Present Day). By J. H. Lobban, M.A. In Two Parts, 2s. each. One Volume, 4s. Prize Edition, 5s.
Forty Elementary Lessons in Chemistry. By W. L. Sargant, M.A., Headmaster, Oakham School. Illustrated. 1s. 6d.
Inorganic Tables, with Notes and Equations. By H. M. Timpany, B.Sc., Science Master, Borough Technical School, Shrewsbury. Crown 8vo, 1s.

A First Latin Reader. With Notes, Exercises, and Vocabulary. By K. P. Wilson, M.A., Fettes College. Crown 8vo, 1s. 6d.
First Latin Sentences and Prose (with Vocabulary). By K. P. Wilson, M.A. 2s. 6d. Also in Two Parts, 1s. 6d. each.
Lower Latin Prose. By K. P. Wilson, M.A. 2s. 6d.
Higher Latin Prose. By H. W. Auden, M.A. 2s. 6d.
Higher Latin Unseens. By the same. 2s. 6d.
Lower Latin Unseens. Selected, with Introduction, by W. Lobban, M.A., Classical Master, Girls' High School, Glasgow. 2s.

Blackwood's Illustrated Classical Texts.

Cæsar—Gallic War, Books I.-III. 1s. 6d. **Cæsar—Gallic War, Books IV., V.** 1s. 6d. **Cæsar—Gallic War, Books VI., VII.** 1s. 6d. With or without Vocabulary.
Xenophon—Anabasis, Books I., II. 1s. 6d. **Horace—Odes, Books III., IV.** 1s. 6d. **Livy—Book XXVIII.** 1s. 6d.

Greek Accidence. For Use in Preparatory and Public Schools. By T. C. Weatherhead, M.A. 1s. 6d.
The Messenian Wars. An Elementary Greek Reader. By H. W. Auden, M.A. 1s. 6d.

All French Verbs in Twelve Hours. By A. J. Wyatt, M.A. 1s.
A First Book of "Free Composition" in French. By J. Edmond Mansion, B.ès L., Royal Academical Institution, Belfast. 1s.
The Children's Guide to the French Language. By Annie G. Ferrier. 1s.
Spartanerjunglinge. A Story of Life in a Cadet College. By Paul von Szczepanski. Edited, with Vocabulary and Notes, by J. Morrison, M.A., Aberdeen Grammar School. 2s.

Full Educational Catalogue sent post free on application to

WILLIAM BLACKWOOD & SONS, 45 George Street, Edinburgh; and 37 Paternoster Row, London, E.C.

London & South-Western Railway

SHORT HOLIDAY TRIPS

To the Continent

CYCLING TOURS in Normandy and Brittany, viâ Southampton

Available for returning from Havre, Cherbourg, or St. Malo.

3 to 14 Days' Excursion Tickets

(3rd Class Rail and 2nd Cabin Steamer) issued as follows:—

Available for 14 Days

London to Havre, 24s. 6d., every Thursday.
Southampton to Havre, 20s. od., every Saturday.
London to Rouen, 1st Class, 38s. od.; and Class, 28s. 6d. } Every Week Day.
Southampton to Rouen, 1st Class, 33s. 6d.; and Class, 26s. } Every Week Day.
By Steamer only between Havre and Rouen.
London to Caen, 28s. od., every Friday and Saturday.
Southampton to Caen, 23s. od., every Friday and Saturday.
London to Trouville, 25s. od., every Friday and Saturday.
Southampton to Trouville, 19s. 6d., every Friday and Saturday.
London to Etretat, 29s. od., every Friday and Saturday.
Southampton to Etretat, 24s. 6d., every Friday and Saturday.
London to St. Malo, for St. Servan, Dinard, Dinan, Mont St. Michel, &c., 24s. 6d., every Saturday.
Southampton to St. Malo, 20s. od., every Saturday.
London to Cherbourg, for Avranches, Coutances, &c., 23s. 6d., every Tuesday.
Southampton to Cherbourg, 17s. od., every Saturday.

Week-End Tickets

London to Havre, 1st Class, 29s. 6d.; and Class, 22s. od.
Southampton to Havre, 1st Class, 23s. od.; and Class, 19s. od.

Issued every Friday, Saturday, and Monday, available for return up to and including Tuesday following date of issue.

14 Days' Excursion Tickets to Paris will be issued for August Bank Holiday.

*** For particulars of Sailings and all further information apply to Mr. H. Holmes, Supt. of the Line, Waterloo Station, London, S.E., or to Mr. T. M. Williams, Docks and Marine Supt., Southampton.

The Company's Guide Book to Holiday Resorts in Normandy and Brittany sent free on application.

CHAS. J. OWENS, *General Manager.*

Messrs. T. C. & E. C. Jack's "Unique" School Books

Editor—T. CARTWRIGHT, B.A., B.Sc.

"The whole Series of Educational Books edited by Mr. Cartwright is a revolution on the past. Their success is established."—*Headmaster of large Scots Public School, June 5, 1903.*

Literary Readers for Infants.
Learning to Read.
Step One, 3d.; Two, 4d.; Three, 6d.; Four, 6d.

For Older Scholars.
The "Jack" Readers.
Book I., 8d.; II., 10d.; III., 1s.; IV., 1s. 4d.; V., 1s. 6d.

Supplementary Readers.

The Children's Scott	1s. 3d.
The Children's Pickwick	1s. 3d.
Captain Cook's Voyages	1s. 3d.
Why Boys should not Smoke	6d.
The Children's Fairy Book	6d.
Lamb's Tales (1st and 2nd Series)	6d.
The Children's Fairy Book	6d.
Book of Notable Days	8d.
Rip Van Winkle	3d.
Rab and his Friends	3d.
Writing for Reading	6d.
Commercial Reader	8d.
Annals of the Cymry	8d.

Periodic Histories.

Book I. B.C. 55–A.D. 1066	1s. od.
,, II. 1066–1485	1s. 3d.
,, III. 1485–1603	1s. 6d.
,, IV. 1603–1714	1s. 6d.
,, V. 1714 to Present Time	1s. 8d.

Concentric Histories.

Step I. Simple Tales Simply Told	1s. od.
,, II. British History Simply Told	1s. 3d.
,, III. British History as Cause and Effect	1s. 6d.
,, IV. The Making of Britain	1s. 6d.
,, V. History of Europe	1s. 8d.

NEWEST—BEST—MOST POPULAR

The "Round the World" Geographical Readers.

Tales of Travel	10d.
Land and Water	1s. od.
Our English Home	1s. 3d.
The British Isles	1s. 4d.
Our Colonial Cousins	1s. 6d.
The Five Continents, each	1s. 6d.
The World	1s. 8d.

Class-Work in English.
Books I.–III., 2d.; IV., V., 3d.; VI., VII., 4d.

"Three-Term" Arithmetic. (Scheme B.)
Book I., 2d.; II.–V., 3d.; VI., 4d.; VII., 5d. (cloth, 1d. extra).
Answers, 6d.

"Three-Term" Algebra.
Books I. and II., 4d.; III., 6d.
Answers, 6d.

Intermediate Arithmetic	10d.
Graphs of Algebraical Functions	8d.

Nature Study.
Books I. and II., 6d.; III.–VI., 8d.

French by the Direct Method.
Book I., 1s. 6d.; II. and III., 1s. 8d.; IV., 2s. 6d.

Livre de Lecture	1s. 8d.
Grammaire française en français	8d.

34 Henrietta Street, London, W.C., and Edinburgh.

THE

PRACTICAL TEACHER

A MONTHLY MAGAZINE AND REVIEW

FOR THE SCHOOL-ROOM AND THE STUDY

Vol. XXVI. No. 1. JULY, 1905. Price 6d.

NOTICES TO CORRESPONDENTS AND SUBSCRIBERS.

"The Practical Teacher" may be ordered of any Newsagent or Bookseller, or at any Bookstall, in the United Kingdom or in the Colonies. Supplies are sent monthly to the chief towns in Australasia, South Africa, and India.

London Office: 35 and 36 Paternoster Row.
Edinburgh Office: Parkside Works.
Dublin Office: 17 Talbot Street.
New York Office: 37 East 18th Street.
Paris: W. H. Smith and Son, 248 Rue de Rivoli.

Subscribers may obtain "The Practical Teacher," post free, from the Publishers at the following terms:—

United Kingdom, Continent, Colonies, and United States } 12 Months, 8/- 6 Months, 4/-

All literary communications should be addressed to the Editor, Office of "The Practical Teacher," 35 and 36 Paternoster Row, London, E.C.

Remittances, Cheques, Post-Office Orders, etc., should be made payable to Thomas Nelson and Sons. Advertisement rates on application.

EDUCATION IN PARLIAMENT.

So far as its Education Bill is concerned, at the present time of writing Scotland stands where it did; that is, the second reading has been given to the Bill; nominally, of course, for nobody ever reads a long Bill, except a few people inside the House and a few people outside—and the Committee stage has been postponed. The Committee stage is a very slow stage—a stage-coach one might call it, in these motoring days, a stage-waggon, almost; the Committee stage-waggon will begin to rumble "after Whitsuntide," whenever that vague date may be. The best that the most hopeful and sanguine Scottish member can say for the prospect, is that if they "sit up all night to it for a week" they may get the non-contentious measure through. Such is the importance attached to an Education Bill in this deciduous Parliament. No Scottish M.P. seems to give his attention to nudging the bill along or clearing a path for it. The Educational Institute of Scotland lengthens year by year its missed opportunity and mistake in not supplying a man for St. Stephen's; St. Stephen's is quite indifferent meanwhile.

But St. Stephen's, though it may placidly regard the somnolent Scottish, cannot be indifferent to the Welsh. The Welsh are always stoning St. Stephen with resolutions, questions, and motions for the adjournment of his House. What, for instance, is the difference between Llanellyn and Llanelly? No Sassenach in the House of Commons could tell, till the other night, when the flag of the Rouge Dragon was unfurled in an embattled House, in defiance of Edwardian leopards.

Some members are in doubt whether the heraldic description of that new flag should be "Rouge Dragon on a field or," or, "Rouge Dragon on a field brazen." But then, as the fable of the two knights teaches, there are always two sides to a shield. Mr Osmond Williams, who is regarded as about the handsomest and pleasantest man in the House of Commons, unfurled the national banner. It was all about Merionethshire, he said. "Where's Merionethshire?" English members whispered to each other, and Scottish members heard so unco' uncouth a name for a county with disdain. Merionethshire, it appeared from the debate, is in Wales, and Wales is in England at present; at any rate, it is in Great Britain; but it flatly refuses to submit itself to an English Education Law. Wales has had the glory of a little Education Act all to itself—the "Defaulting Authorities Act" as it is popularly called. The Welsh members do not like that Act, however; the very name of it is offensive; "defaulting" suggests defaulters and defalcations—the traditionary Taffian proceedings, in short. It is a brief and little Act, but Mr. Osmond Williams called it "a heavy bludgeon." By means of that bludgeon the Board of Education—Sir William Anson, to wit—(the House smiled at the idea of so small a Minister wielding anything so big as a bludgeon) had stopped certain moneys, to wit, £2400, from passing into the pocket of the County Treasurer for Merioneth. And all because of £400 said to be due to Merionethshire Church of England schools! Where was the rhyme or reason in stopping six times as much money as could be claimed? "There is a great deal more in this unhappy dispute than the triumph of church or chapel, or the permanence of the Establishment," said Mr. Osmond Williams, breaking forth into Celtic eloquence towards the end of his speech. "The rights of conscience are attacked when a man is made to pay for the teaching of dogma in which he does not believe; the liberty of the citizen is attacked when the refusal of a Local Authority to vote public money for sectarian purposes involves imprisonment; the constitution is attacked when a Minister of the Crown deliberately forces upon an unwilling country an Act which the electors of that country have deliberately condemned. Burke has said that people are governed by a knowledge of their temper and a judicious management of it, and that in conflicts between a people and their rulers the presumption of right is at least equally in favour of the people. The people of Wales to-day are just as much in the right and the Govern-

ment in the wrong as when Pym and Hampden made their protest against the payment of ship money,"—and "all the serried ranks of Wales gave back a rousing cheer"—Sir William Anson shivering on the Treasury bench meanwhile.

Sir Alfred Thomas from Glamorganshire compared Sir William Anson to Shylock in the course of the debate, and declared that he wanted a pound of flesh off the ribs of Merionethshire. Sir William smiled, and so did the House; Sir William does not look like a cannibal, or even a beefeater: the fare of John the Baptist would seem to be more in Sir William's line. Mr. Cripps (another attenuated and dry-looking person on the Speaker's right) contributed a supply of oil to the troubled waters; he ladled it out, and flung it both left and right; a hairdresser with a bottle could not be more lavish and oleaginous than was the ingenious Mr. Cripps, pillar of the Church Schools Emergency League, and ordinarily the terror of Sir William. What Mr. Cripps wanted (he informed an oil-bespattered House) "was, if possible, to bring about some means by which those who had strong feelings on this question—Nonconformist, Church of England, or any other denomination—should have the right and opportunity of bringing up their children, as far as possible, in the denomination to which their parents adhered" in *any* school. ("No, no!" said Nonconformist Mr. George White of Norwich; "No, no!" said Mr. Yoxall of Nottingham and the N.U.T.)

It was then that Mr. Duke uprose. Mr. Duke, of Plymouth or Devonport or thereabouts, used to be a pupil-teacher and a Nonconformist, it is understood, but he is now a King's Counsel, a Churchman, and a Conservative M.P. Mr. Duke was not as oleaginous as Mr. Cripps; in fact, he was decidedly acrid, the result of old experiences, perhaps. It was Mr. Duke who confounded Llanellyn with Llanelly, and presently confounded them both, for he got neither pronunciation nor the locality right, and "failed" in spelling the word as badly as any pupil-teacher might have done. He "spoke with ostentatious ignorance"—"or perhaps it was meant for humour," Mr. Ellis Griffith told him; and next Lieutenant-Colonel Pryce-Jones, a Welsh Unionist member, made the best speech of his life, astounding everybody who has ever borne his speeches before.

Next Sir William Anson rose. You can see beforehand, for minutes beforehand, when Sir William is about to rise; he rises as slowly as bread; there is no springing up and jumping into the fray with Sir William; he rises as nervously and primly as an old maid, and like an old maid he fingers for the skirt of his gown. But when he was up this time he spoke with almost warmth, and hit out a few blows that were almost doughty. He showed, or seemed to show, that the Welsh County Councils, while calling on voluntary school managers to put their premises in repair, had neglected to repair the Council schools, particularly in Carnarvon. "I will not follow the history of Carnarvonshire further," he said, "but I may remind the hon. member for Carnarvon, the next time he indulges in rhetorical expressions about pure dogma and foul drains, that he must recollect that the absence of dogma is not inconsistent with very insanitary conditions," at which retort the ranks on the Speaker's right gave forth a hearty cheer.

Mr. Lloyd-George, member for Carnarvon, was not very effective in replying to all this, the House seemed to think, but he gave some examples of anomalies in the educational system which the Defaulting Authorities Act was being used to shore up. "In one Church school, out of the entire total of children in attendance, only six were Church children," he said, "and in another school only three were Church children. In a third school there were only two Church children, and in a fourth there was not a single Church child at all." But when the vote was taken at midnight, the Government had a majority of ninety-eight. So now the scene of warfare shifts to the hills and valleys of Merioneth, and the "Nonconformist" children in the "Church" schools are to be called forth. "To your tents, O Israel!"

The non-provided schools have been defined as "schools which are unprovided with proper school requisites"; but they provide almost a plethora of debate for Parliament just now. The House of Lords has lately had a whack-in at them, one might colloquially say, if it were proper to use such an undignified term about the proceedings of the House of Lords. Lord Kinnaird began it. Lord Kinnaird is not very lordly to look at, but he is in one sense the pride of the House of Lords. He carries on the great Lord Shaftesbury tradition. He is Evangelical, Low-Church, and pietistic. When in "Society" people talk about "the smart set" and the wickedness of the "hupper suckles," the reply of the gay young peers is always "Nothing of the sort—look at Kinnaird!" Lord Kinnaird wanted to know if the Board of Education could not do something to undo the mischief caused by the London County Council abolishing fees in London non-provided schools. He had his eye on a certain Evangelical, Low Church, non-provided school near Westbourne Grove, the region of the Universal Provider. "Call in Whiteley to it!" somebody jestingly said, when the tale of woe about this non-provided school was poured into the dull ear of an inattentive House of Lords. Over £26,000 had been cast away by the abolition of school fees in London, and the Marquis of Londonderry was very frank, if not very audible or grammatical, in his expressions of regret. Lord Londonderry is a great man up Durham way, who will talk by the hour at farmers' meetings, but he cannot talk fit to be heard in the House of Lords. He was Chairman of the London School Board for a year, and that, together with his marquisate, made him President of the Board of Education. But it is a pity he never went to a Board school when a boy; he would have been so much clearer in exposition, and so much more audible and grammatical in his language, perhaps, if he had.

Lord (Lyulph) Stanley of Alderley seemed to feel this himself, for he proceeded to vaunt the London School Board and the London Board schools in the very face of the Marquis. He also poured forth a flood of figures, data, statistics, details, particulars, returns, names of teachers, names of schools, names of streets, historical records concerning certain schools, &c. &c., all in a breath and without consulting even a scrap of a note, till the House of Lords fairly gasped. But he was not allowed to paralyse the gilded chamber. The Bishop of St. David's arose and smote Lord Stanley. The Bishop is a Welshman; Lord Stanley is a Welshman by adoption, so to speak—he lives in Anglesey, and stirs up educational affairs in Mona, the isle of the slaughtered bards. Lord Stanley as an adopted Welshman had

BRITISH MUSEUM

introduced the question of the Defaulting Authorities Act. Lord Londonderry was conducting a little civil war, he said. The Bishop of St. David's made the rafters ring and the throne tremble—that expression is used literally, not figuratively—in his reply. Best of all was his repudiation of Lord Stanley's apparent opinion that the school buildings were the things of most importance about a school. "The *teachers* are," said the Bishop. "I know they are; I have been a teacher myself. A staff of sufficient, efficient, and well-paid teachers, that is *the* desideratum. I repudiate Lord Stanley's heresy that the buildings are the thing!" But nobody said "Hear, hear!"

The House of Lords then proceeded to consider Fiscal Reform, and so ended the storm in a tea-cup stirred up by Lord Kinnaird. "Nobody seemed a penny the worse," and no school will be a penny the better. So futile has education in Parliament become.

BY MANY HANDS.

"Quot homines, tot sententiæ."

ARDENT Conferencites are already making up parties for next Easter at Scarbro'. Some of the Llandudno coteries have sworn to be true to each other until that happy time, and are already inquiring for suitable quarters—"where the light is not switched off at eleven." The revival of the curfew at Llandudno in several boarding-houses was not received with that enthusiasm one would expect from a profession "up" in historic lore.

BETWEEN now and the next Conference it would perhaps be well if some bright spirit could devise a substitute for the stereotyped conversazione which does duty on the Monday evening. Speaking more in sorrow than in anger, I must say that at the Llandudno Hippodrome it seemed to me like attending the funeral of a maiden aunt—and waiting to hear the will read.

HE was a kind-hearted chairman of school-managers and eke a member of the Visiting Committee of the local prison. He was conversing sympathetically one day with a poor debtor in prison, incarcerated by the decree of an unfeeling County Court judge. The debtor asked the kind-hearted one if he could give him employment to enable him to right his financial boat. "I am afraid I have nothing to offer you but a little hoeing. Could you do that?" "Oh yes, sir," was the eager response; "that's why they sent me here." There was a silence which could be felt, and the kind-hearted chairman aged visibly.

THE scholarship scheme which the London County Council recently passed brought forth an observation from the Board of Education that "it would seem to be open to criticism on the ground of profusion." It is to be hoped that the epidemic will spread. A little more profusion on the financial side in the teaching profession would be grateful and comforting. Neither the Board of Education nor any other Board could conscientiously plead guilty of profusion up to the present. Man wants but little here below—and the schoolmaster generally gets it.

AT the Conference of the Association of Education Committees, the President told a story which should not be allowed to lapse into oblivion. He said that an experienced educationist in a large Yorkshire constituency had recently been to America on a mission of investigation. His Committee voted the sum of £200 for expenses, and after an absence of six or seven weeks the gentleman returned and handed back £71 as his balance in hand. Such golden deeds as these should not go unrecorded. It is a departure from the usual supplementary estimate to defray the cost of "unforeseen contingencies," but it is a precedent which will not be popular.

WE talk in these days of reaching the German standard of technical education. The Hamburg standard seems to have reached high-water mark, for we read that certain master printers were prohibited from taking apprentices because "professional instruction was not properly given." If such an inspection were made in England, and the same standard demanded, we are afraid many establishments would have to go into dry dock for repairs, so to speak.

Technical to a Fault.

N.U.T. NOTES.

THAT "nothing succeeds like success" is nowadays fairly well recognised; and the latest issue of "Quarterly Notes" bears ample evidence of the continued prosperity of the useful little Society known commonly by its initials "T.P.S." For the Society, the year has opened most auspiciously. In the first quarter, no fewer than 740 new members were enrolled; and, in conversation with a couple of prominent members of the Board of Management a short time ago, I learned that the rate of increase is being steadily maintained. There should be little or no difficulty in obtaining the 2500 new recruits that Mr. Golding and his efficient Board have set their hearts on, especially if the local secretaries strive to secure the goal—"Every agency, at least one new member per year." Last year, thirty-four local agencies were unable to send up a single application, and although this result is better than that of the previous year, there is still much room for improvement. The "record" of 102 new members in any one year was set up by the West Ham Agency in 1902, and still holds the field. Whether it will be beaten in 1905 is at present doubtful; but the ambitious T.P.S. members in Leeds are aiming at *two hundred* additions to their roll, and, as they have a large *clientèle* on which to draw, with energy and determination, they may succeed. One or two ominous paragraphs in *The Schoolmaster* seem to indicate a growing tendency on the part of niggardly educational authorities to restrict payment of salary during periods of sickness to four weeks. As none of us are immune from illness, more or less prolonged, there is the greater necessity for teachers of all ages to take advantage of the benefits provided, at exceptionally

The Teachers' Provident Society.

low rates, by their own Friendly Society. An article on "What I Learnt at the Audit," by W. B. Ambler (Auditor), is so much to the point that it ought to be carefully preserved by the local secretaries, and its lessons studiously assimilated; whilst an appreciative reference to Mr. J. R. Langler, B.A., F.R.G.S., shows that this "grand old man" of the Union still evinces his interest in the invaluable Society he laboured so heartily to establish.

THE work of the Union is mainly done by six important standing committees, although "special" committees are constantly being formed as new and urgent questions arise. The standing committees are arranged in three pairs—(1) Law (and Tenure) and Finance; (2) Education and Organisation; (3) Parliamentary and Examinations Board; and no member can serve on more than one committee in each pair. In the past there has been much discussion as to whether the committees should choose their own chairmen, or whether the Executive should exercise this privilege. This year, however, the question was not even mentioned, and the Executive made the following selections to the responsible positions:—

Chairmen of Committees.

Committee.	Chairman.	Vice-Chairman.
1. Law	Mr. W. J. Prosser.	Mr. F. W. Goldstone.
2. Tenure	Mr. G. T. Hyden.	Mr. T. Butland.
3. Finance	*Mr. F. C. Blackburn.	*Mr. J. T. Boulter.
4. Education	*Mr. A. R. Pickles, B.A.	*Miss Cleghorn.
5. Organisation . . .	*Mr. G. J. Rankilor.	*Mr. A. S. Caudle.
6. Examinations Board	*Mr. T. F. Bowers, B.A.	Mr. W. Shawcross, B.A.
7. Parliamentary . .	*Mr. M. Jackman.	*Mr. J. J. Cullum.

* Held the same position last year.

Nine of the above officers discharged the same functions last year, and the gentlemen newly appointed have all fully earned the confidence of their Executive colleagues. Mr. Prosser and Mr. Hyden have acted for several years in the capacity of vice-chairmen of the committees over whose deliberations they are now called on to preside, the latter gentleman taking the place of Mr. T. P. Sykes, who by an unwritten law vacated his chairmanship on becoming an officer of the Union. Mr. F. W. Goldstone has, during his one year's work at Russell Square, gained a unique reputation for industry, capacity, sound judgment, and reliability, and recognition has come much earlier than usually befalls the Executive neophyte. Mr. Walter Shawcross, B.A., has no easy task before him, as the successor to Mr. C. W. Crook, B.A., B.Sc., but his friends are sanguine enough to feel that the work will not be allowed to suffer in his able hands. Mr. T. Butland, almost the *doyen* of the Executive, when measured by years, is a hale old sexagenarian, with plenty of leisure time at his disposal, and a ripe experience of tenure difficulties. I hope he may long be spared both to serve the Union he loves so well, and to enjoy the modest recognition of forty years' hard work in schools, which he now receives from a grateful (!) country.

THE President of the Union had a rousing reception on taking the chair at the inaugural meeting of the Executive, and proceeded forthwith to extend a hearty welcome to the eight newcomers. Amongst these, a veritable ovation was accorded to Mr. W. A. Nicholls, the popular President of the L.T.A., whose non-success a year ago was greatly and justly deplored. It was amusing, by the way, to observe that the Chairman had fortified himself with the "picture gallery" published by a contemporary; although he would hardly have run a greater risk had he boldly ventured on a new member's name haphazard, than he did by relying on the "counterfeit presentments" lying before him. (Don't think this bitter, Mr. Editor: but *passus sum.*) A notable innovation in the Executive's standing orders provides that when the afternoon session is prolonged beyond 6 P.M. a third session shall be counted. The morning session lasts two and a half hours, from 10.30 A.M. to 1 P.M. Hitherto the afternoon sessions have varied in length, from almost any period up to seven hours, and some of us were of opinion that those members who remained to complete the business after 6 P.M. were entitled to whatever credit is attached to an additional attendance. The alteration was only carried by a majority of two votes against the opposition of Mr. Coward, and those who generally leave Bolton House, in order to catch early evening trains. I have no possible objection to members leaving early, if they wish. In my younger and more strenuous days I used invariably to be "in at the death," and have often remained until after 10 P.M. helping to finish the agenda. Nowadays I find a day of from 9.30 A.M. to 5.30 P.M.—with an interval of an hour and a quarter for luncheon—quite long enough for my health and vigour. Yet I am grateful to the younger men and the "stalwarts" who never rise from their seats whilst there is work to be done; and I trust that no further attempt will be made to prevent a record being properly kept of their persistence and devotion to duty.

At Russell Square.

THE Council of the N.U.T. Benevolent Fund began its work well by electing as its chairman for the current year Mr. W. Brenchley, a gentleman who twelve months ago was chosen as deputy to Mr. T. G. West, but who had little opportunity of displaying his undoubted ability. Equally felicitous was the choice of Miss Cleghorn for the vice-chair, for this accomplished Sheffield lady was, as one of her supporters truly said, "one of our hardest workers, clear in thought and speech, and one of only eight who were on the Council in '95." There seemed to be something very like a "rush" to have a voice in the general eulogy, and she will more than justify the honour and responsibility which now devolve on her. Four well-known faces had disappeared from the Council chamber, and the Council at once placed on record its appreciation of the work done for the Fund by Miss Selvage, Messrs. Baldwin, Greenwood, and the writer of these "Notes." I confess to a feeling of very great regret at relinquishing my connection with the noblest portion of the Union's work, but the re-arrangement of the times of meeting of the Executive's standing committees left me practically no option in the matter. The new Vice-President will much more than take my place, whilst the Executive utilised a wise discretion in choosing the great-hearted Mr. George Baddeley as one of their representatives. Mr. C. W. Hole—cordially welcomed after his long illness—and Mr. A. Tutt are again in the chairs of the Finance Committee, and Messrs. Rand and Hone guide the deliberations of the Relief and Loans Committee for the second time. Mr. Phil. Thomas succeeds to the chair of the Organisation Committee—an admirable

The "B. and O." Council.

appointment—and Mr. J. W. Bunn, who has very rapidly won his spurs, is his Vice-Chairman. The September meeting of the Council will be held at the Girls' Home at Sheffield, an establishment so delightfully managed that any teacher whose ill-luck it is to fall by the way leaving fatherless children of tender years, could view the entrusting of these precious charges to the care of the Sheffield House Committee and their capable staff with every confidence.

A. C.

NOTES FROM THE NORTH.

THAT the Scottish Education Bill of 1905 (the third brought in by the present Government) is in imminent peril goes without saying. Assuming that the House rises on the 12th August, and after making allowance for business that has priority, it will be seen that the prospects are not rosy. So unsatisfactory does the position of the Bill appear, that the Educational Institute has again sent out a circular letter in which it is said that private information has been received that its fate is hanging in the balance. Without entering into the causes of this unsatisfactory position the Institute urges immediate and vigorous action on the part of Local Associations, both through the officials and by individual members, in order to let Members of Parliament know in explicit terms the strong desire of teachers that the Bill should pass this session. The more plainly the Institute holds that it is stated that the influence of teachers will be cast for or against parliamentary candidates according to their attitude towards the Bill, the more effective will be the representations. Members should be asked specifically to use all their influence in favour of the Bill—those on the Government side to insist on the Bill being proceeded with, those on the Opposition side to expedite its passage through Committee. It will not take long now to decide the fate of the Bill, and the hopes of most of us are not at present very high.

The Education Bill.

THE Annual Report for 1904-05 of the Federation Council of this Association has just been issued, and we note that very great progress has been made during the session just closed. The membership has been very largely increased and the funds are in a very healthy condition. It would appear that the professional union spirit is growing, and that there is being felt a greater desire on the part of the class teachers of Scotland to unite for professional and educational aims. With regard to Superannuation, the following occurs. Though the Bill presently before Parliament contains the clause of last year granting to School Boards the power—if they care to use it—of adding to the Superannuation allowance of any of their teachers, we are still compelled to dwell on the total inadequacy provided by the Superannuation Act. That this is a matter which is now assuming the place of first importance in the teacher's mind is evidenced by the frequency with which it is being discussed at meetings of educationists of every shade of opinion, and in every part of the country. What we ask for the cancelling of a teacher's certificate is simply for him its value in the open market.

Scottish Class Teachers' Association.

THE results of the voting for the President, Vice-President, and General Committee of Management have just been declared. Mr. William Service, M.A., B.Sc., Coatbridge, has been elected President with 2370 votes. The unsuccessful candidates, Mr J. M'Kenzie, Aberdeen, and Mr J. Mudie, Dundee, polled 1440 and 1232 respectively. For the first time in the history of the Institute a lady has been selected for one of the higher offices. Miss Isabel C. Hamilton, LL.A., has been chosen Vice-President with 2556 votes against 2517 given to Mr. James Will, M.A., New Pitsligo. Out of an electorate of a little over 6500 no fewer than 5073 have exercised the franchise. There can be little doubt that a greater interest is being taken in the elections. This year the class teachers have secured 25 representatives out of a committee of 72.

R. D.

E.I.S. Doings.

THE ECONOMY OF FOOLS.

THE Feast of Fools of bygone days was a time of general license and revelry. During the brief season of the Saturnalia, the Roman world was turned upside down, and despite the anathemas of the parsons, the Feast found its way into the Christian Church. The donkey figured so prominently in this Feast that it eventually came to be known as the Feast of the Asses, and many people since have blossomed into casual asses. For instance, at Beauvais the rubric ordered the priest when he dismissed his congregation to bray three times, the people braying three times in response; and as the ass was led to the altar he was greeted with a hymn. In the south of France the Feast survived till 1644. The scene, as usual, was in a church! the actors, "dressing themselves in priests' robes turned inside out, read prayers from books turned upside down, thro' spectacles of orange peel, using coal or flour for incense, amid a babblement of confused cries, and the mimic bellowings of cattle and grunting of pigs."

The Feast has gone, but the Fools remain. Carlyle knew this, for he is said to have divided mankind into wise men and fools—mostly fools. There is nothing new about the classification, except perhaps its breadth. Many persons have made similar classifications before Carlyle; many have made them since. In fact, mankind is prone to such classifications. The reason is not far to seek. It is so comforting to think the other fellow a fool—and it costs nothing. It is not necessary to *tell* him he is a fool—that *might* cost something. It might lead to argument, and the fool's arguments are not always classic, or logical, either in word or deed. You just simply *think* he is a fool, and that settles it. 'Tis true he may be ignorant of the fact, but that is only evidence of his disease, for it takes a philosopher to know himself.

The harmless folly of children is best described as silliness. The act of folly may excite our indignation, our pity, or even our amusement. There is rarely much sting in it, and it claims our indulgence rather than our censure. But where folly passes into a habit, the case is more serious. The chronic folly of the child is the raw wound of the teacher, and some of the suffering entailed is vicarious. The worries, anxieties, and disappointments of the teacher's life are regularly subscribed to by the repeated follies of childhood.

Folly may be the result of stupidity. It may be the

product of every grade of stupidity, from mere dulness to absolute idiocy. All such cases should receive careful consideration and treatment. The acts of folly which are so trying to the teacher are often only symptoms of mental disease. Laziness, pure carelessness, stupidity, bad temper, and kindred weaknesses are roughly and rapidly judged to be acts of folly, and are often punished as such. The fact is a sorry one, but it is none the less true. It then becomes a case of one species of fool correcting another; of the blind leading the blind. If the teacher is to avoid the exercise of a foolish discipline in such cases, he should have some special knowledge with regard to the mental disturbances to which children are subject, and as to the best way of treating them.

The vicious fool is not unknown in the schools, but the school species is a feeble specimen when compared with the more finished and older product of the street. The vices are the dumping-ground of fools, and a weak morality is only too often backed by a weak intellect. Such fools will rarely listen to reason. Advice, admonition, and exhortation are thrown away upon them. Noah preached 120 years to the fools around him; but they despised the wisdom of his words and perished. Experience is a dear school, but it is the only school for fools, for they will learn in no other. The mental weakness of the fool may even make wrong-doing a sport to him. His moral sense is dulled, for it is clothed in a pachydermatous hide of ignorance, indifference, or indulgence. "A whip for the horse, a bridle for the ass, and a rod for the fool's back," says Solomon, who was bitterly contemptuous of fools.

Perhaps no person is better acquainted with fools than the teacher, for "he is an instructor of the foolish and a teacher of babes." He is by virtue of his office conversant with many types. He sees folly in the germ or bud, and at times has the mortification of seeing it develop in spite of all that he may do. But such experiences are not confined to him alone. They are the common lot of all the educational workers in the world.

A fool, originally, was one who made grimaces, and the professional fool still makes grimaces. He serves some sort of economy in life by tickling the risibility of a crowd. He is a stimulant for the play of the light emotions. He is the priest and apostle of mirth. He is the purveyor of a healthy laughter, and he thus fills a useful place in the recreative world. Recreation is now recognised as a necessity, and so the mirth-provoking fool is tolerated. He has outlived the old Puritan idea that such forms of recreation tended to relax the moral fibre.

But what useful purpose does the orthodox fool serve? As a boy, he is the bane of a teacher's life; as a man, he receives the pity or contempt of his fellows. What consolation, if any, can the teacher and his many educational allies derive from the existence of so many of their failures?

Competition has been defined as the act of endeavouring to gain what another endeavours to gain. It is the form taken in the struggle for existence. The economic relations of men to each other are now largely determined by individual effort. Without entering into the conflicting opinions of the various economic schools, most men believe, as a general rule, that each man must be responsible for his own economic well-being. The working world is viewed as a world of conflicting or competing interests, and modern freedom is made responsible for this system. Competition may be modified by laws, by co-operation, by trusts, and in various other ways; but the greatest modifying influence at work in this direction is the folly of fools.

There are many men who regard competition as an evil. Most men admit the strain of competition, and would be only too glad to see that strain reduced in any rational way. Hobbs says that the natural state of mankind is a state of war, and competition is the latter-day, civilised form which that warfare takes. It may be a tonic in some cases, but it is probably an evil in many more.

The strain may be great, but it would undoubtedly be much greater but for the folly of fools. In that fair, normal, honest competition, in which each man strives his best, the occasional fool is now and then absent. The intermittent fool converts progress into a kind of greasy pole, on which he climbs a foot with difficulty, and slips back two feet with facility. The occasional fool is not a serious factor in competition—it is too keen to admit of even isolated mistakes; but the intermittent fool is a negligible quantity. His competition can hardly be said to exist at all.

There remains the case of the chronic fool. He lives in an atmosphere of folly. Folly is a second nature to him, and his daily rôle is to play the fool. He may be a harmless, stupid, or vicious fool, but in any case he does not enter the field of honest competition. From the competitive point of view, his province is to make life somewhat more endurable for his wiser fellows. The fewer the competitors the greater the chance of a prize. The clever, the earnest, the virtuous, the industrious are the quickening forces of life. Economically they are the salt of the earth. They are the oxygen, which is diluted and made valuable by the nitrogen of the fools. In the struggle for existence the "nitrogen" is therefore a valuable asset. We could not live in an atmosphere that was all "oxygen"; we should simply be vitalised into a more speedy death.

The fool may be the bane of the teacher, but he is the purse of the lawyer, the prey of the rogue, and the raw material of the preacher. He supplies much of the material and support for many of our industries and callings. We could all wish it otherwise, but the drunken fool is a prop of the saloons, the gambling fool the joy of the bookmaker, and the speculating fool the backbone of the Stock Exchange. The "smart" salesman often has fools for customers, the smartness and the folly generally being in inverse ratio to each other. The political fool sells his birthright for a mess of pottage, whilst the vicious and self-indulgent fools are the clients of our doctors and the recruits for our hospitals, workhouses, and prisons. The subject is a tempting one, but it is not necessary to pursue it further.

Locke would almost seem to imply that the teacher makes little else than the "nitrogen." He asserts that wisdom is above the reach of most children, because it requires a good natural temper, application, and experience. He does not say all children are fools, but in a negative way he gets very near it. He says that the most that can be done for a child in the way of wisdom is to prevent him from being cunning, which is a sham wisdom.

There is, no doubt, some degree of truth in Locke's statement; but the lack-wisdom child of Locke and the stupid or foolish child of the school are different creatures. The silly child is irritating, but the dullard is depressing; and it is the future of the latter, rather than the former, that causes the earnest teacher so much anxiety. Silliness may evaporate with age—it

often does. The dullard may be no fool—sometimes he is not. But such cases pass out of present consideration. We are concerned with those only who remain fools.

The teacher's task should be to send out the dullard with a sound morality as compensation for his weak intellect. It is true there can be no fine perception of right and wrong, perhaps, with a weak intellect; but a good, healthy average of practical morality might be attempted. The dullard then may still be only a diluter of industrial competition, but morally he will form a part of the soundest elements of the national life.

THE TEACHING OF DOMESTIC SCIENCE IN THE UNITED STATES.

I.

THE fifteenth volume of the Special Reports on Educational Subjects contains the results of Miss Alice Ravenhill's inquiries, made during 1901, as to the teaching of domestic science in the United States. Miss Ravenhill divides her report into three parts, in the first of which she deals with the teaching and training given in State schools and colleges, in the second with that given in private institutions, and in the third with the social agencies for the promotion of domestic science teaching. Details as to school and college courses and cost of equipment are given in the very interesting appendices to the volume.

Under the name of Domestic Science may be included, so far as the grade schools and high schools are concerned, the subjects of cooking and sewing and the elements of personal hygiene and house sanitation. In colleges, normal schools, and technical institutes the term has a wider meaning. As taught here, the subject is often subdivided into Domestic Science and Domestic Art, the former including, among many other courses, the study of Chemistry, Bacteriology, Physics, and Sanitation; the latter, Design and House Decoration, Dressmaking, Millinery, and the History of Costume.

The subject has received much attention already, and its importance, largely owing to the efforts of women's clubs and societies and to the success of past efforts, is being increasingly recognised. The first efforts to introduce the teaching of domestic science into schools were due to private enterprise. Some sewing was taught in Boston schools in 1840, and the Young Women's Christian Association began to give cooking lessons to public school children in 1876. After 1885 Cooking was taught in the public schools of Boston, and shortly after in Philadelphia, Providence, and Washington. In the same year, Physiology and Hygiene became school subjects in all State schools. There are three classes of opinion as to the grounds on which Domestic Science should be taught and the methods which should be employed. The first is "the utilitarian party, who desire to secure the instruction for girls in Cooking, Sewing, Cleaning, and the elements of House Sanitation, with the sole view of preparing the home-makers of the future for the duties which will devolve upon them." The second class contains the manual training advocates, who hope for the acquirement of "quick observation, rapid correlation between hand and eye, careful precision, and skilled fingers," with an increased realisation of the dignity of household employments. The third class contains "those who have recognised the real educational importance of the subject in all its fulness and scope, when judiciously introduced into schools."

A very important step was taken towards securing unity of opinion and action when in 1899 the first Conference of Teachers of Home Economics was held at Lake Placid. Under the chairmanship of Mrs. Ellen H. Richards, Professor of Sanitary Chemistry in the Massachusetts Institute of Technology, this conference, which has met annually, has had a powerful influence. At the last meeting mentioned in this report, at which Miss Ravenhill was herself present, a valuable report was read by Miss Helen Kinné, Professor of Domestic Science at Teachers' College, Columbia University, dealing with the state of public opinion, the value of the subjects, and the general order in which the subjects included in the various courses for schools and universities should be taught. The meeting of this conference of teachers and sympathisers may be taken as a sign that public opinion in the United States is really awakened to the importance of the subject, for the "members were at work in at least fifteen States, and held degrees from fifteen different colleges." Besides teachers and professors, there were at the conference representatives of social organisations, to whom the movement owes much of its success. These organisations are of two sorts — philanthropic agencies and women's clubs.

The work of the philanthropic agencies consists chiefly in giving free lessons in Domestic Science to children of various ages. The women's clubs are societies linked together for any common object. "The clubs of a district, town, or city are usually federated under a president, who, while supreme in his district, is subservient to the county or State president; the whole organisation finds its focus in the national president." It is obvious that such associations may exert a powerful influence upon public opinion, and their usefulness is increased by the holding of periodical congresses for the study of selected subjects. Among the most influential of the clubs formed for the encouragement of Domestic Science teaching, Miss Ravenhill mentions the Illinois Association of Domestic Science, the Sanitary Science Club of the Association of College Alumnæ, and the Civic League. The first of these aims particularly at giving facilities for the education of farmers' wives in Domestic Science, and was successful in 1901 in founding scholarships for girls at the Illinois State University. The Sanitary Science Club of College Alumnæ has made valuable researches into home sanitation, the published results of which form a valuable and widely used text-book. The work of the Civic League consists chiefly in the arrangement of courses of lectures and the organisation of a School Visiting Committee, whose work is much appreciated by teachers.

Attention must now be given to the actual work that goes on in grade schools, the work in high schools, training colleges, and technical institutes being left for a later article.

The State provides free education in all grades, from Kindergarten to University, but the State schools are of course supplemented by many private institutions. The "grade" schools are for children between the ages of 7 or 8 and 12 or 14. At about 14, those children whose education is to be continued go on to the high school, which they may attend for four years.

The teaching of Domestic Science in each city is under the care of a supervisor, who is generally a

woman. As a large proportion of the children leave school at 14, the teaching given in the Grade schools is recognised as likely to exert a more important influence on national life than that given in high schools. In many schools the only Domestic Science subjects taught, besides Hygiene, are Cooking and the elements of cleaning. Even these are not taught in rural schools. The chief obstacles in the way of the introduction of these subjects into schools are parental objections, want of accommodation, and the difficulty in co-educational schools of finding appropriate occupations for the boys while the girls are thus occupied. As these difficulties are being gradually overcome, the subject is being increasingly taught.

Girls generally begin cooking lessons in the 6th, 7th, or 8th grade, at the age of 12 or 13. They then generally have one lesson a week. The course usually extends over two years. The length of the lessons varies from 1¼ to 2½ hours. The number of pupils in a class varies greatly, from 12 to 40, or even 50. Thus in Washington the course extends over two years, the lessons last an hour and a quarter, and a class consists of 12 pupils. At Toledo the length of the course is two years, of the lessons 1½ hours weekly, and the number of pupils in each class is 30. Want of accommodation makes it often impossible for all the girls eligible for instruction to attend the cooking classes.

The system of centres, to which classes from various schools go for their cooking lessons, is frequently adopted. This system has the advantage of economy of equipment, but makes it difficult to correlate the instruction given with the rest of the school work. Basements are often utilised for the teaching of cookery, with the result that light and ventilation are often defective. New schools in New York City and Washington are provided with special "cooking laboratories," which serve as centres for other schools.

The tables used in cooking laboratories accommodate two or four pupils, or are horseshoe-shaped and accommodate a larger number. They are from 30 to 33½ inches in height, and are covered with hard wood, metal, slate, or tiles. About 6 or 8 inches above the back part of the table runs an iron grid, beneath which are Bunsen gas-burners, or gas-rings Immediately under the tops of the table are two sliding boards, one for bread and one for meat; below these two drawers, one for knives, spoons, measuring-cups, and other smallware, the other for notebooks and recipes. Below the drawers are a metal bin for flour or potatoes, and a cupboard for dishes and bowls. A sliding seat is also provided. A great feature of the cooking laboratory is the dining-room, which is used for table sewing lessons, and for the simple dinner offered to the principal and other visitors, with which many grade-school cooking courses conclude.

(To be Continued.)

A GERMAN SOLUTION OF AN EDUCATIONAL PROBLEM.

BY W. T. THOMPSON, B.A. LOND.

FOR the past two or three years the system of school organisation adopted by the town of Mannheim in Baden has been the object of close study, of warm praise, and of equally violent attack by all who are in any way interested in the work of elementary education in Germany. Many of the teachers' associations and educational experts in Germany have sent delegates to study its practical working on the spot. What Dr. Sickinger, the initiator of the present system, proudly claims as a reform in the organisation of public elementary schools, has attracted to Mannheim expert visitors from France, Denmark, Austria, and Switzerland, so that the town of which he is the educational ruler has been called the "Burgdorf of Germany."

The system adopted in Mannheim has been already definitely adopted by some towns, whilst others have established experimental classes for the purpose of watching its working. A formidable mass of literary effort has accumulated itself round this subject, for the most part discussing it in a critical but fair spirit, but at other times overwhelming the system and its author with those ponderous epithets with which the German language abounds. The question involved can be best discussed by following the order of Dr. Sickinger's exposition of his system, and giving our readers to begin with an account of

The History of School Organisation in Mannheim.

The Mannheim schools are conducted under a highly centralised system. The administrative body responsible for the conduct of educational affairs is the *Schulkommission*, with an Executive Officer, the *Stadtschulrat*, who is practically the Head Teacher of all the seventeen blocks of schools in the town. It is true there are *Oberlehrer*, but as they must teach at least twenty hours per week, they can do very little supervision. None of the seventeen blocks of schools are independent organisations, serving for the entire educational needs of the children of the district in which they are situated. Some of the classes comprising the highest years of school instruction are only found in certain blocks, and many of the subsidiary classes to which, under Dr. Sickinger's present organisation, a child may be relegated, only exist in particular school buildings, so that the locality in which a child receives instruction may change several times in the course of its school life. Thus the Mannheim system, unlike that prevailing here, is not made up of a number of separate schools, each serving the needs of a locality, carrying out practically similar curricula, and for purposes of administration linked together under the control of one committee, but of a single school, carried on in detached buildings, and controlled even down to relatively small points by one powerful will.

Up to 1870 the school organisation in Mannheim was "confessional," or to use our term, "denominational." In that year these various schools were replaced by one school for all denominations, with six years of instruction; and another with a more extended curriculum and a higher fee, having eight years of instruction. At the same time the Preparatory Trades' School was incorporated with the eight-class school, the mathematical instruction given in it being divided out between the last two years of instruction. The instruction in this higher elementary school coincided with the normal course of instruction laid down for all children in the Grand Duchy only in its literary part, but in its mathematical part it went far beyond it, overlapping to a large extent the work done in the Gymnasium. In 1872 the Town Council of Mannheim abolished the six-class school, and made attendance at the eight-class school having an extended curriculum obligatory for all children. The object of making the change was

to allow all children without exception to participate in the benefits of extended instruction. As to the possibility of all children being mentally capable of receiving this extended instruction, it was declared that "the extended scheme of instruction contains no more than what even a child of average ability can with ordinary industry and without special exertion acquire in the eight years of instruction." It was further declared that the course laid down was capable of being acquired by children generally without extra teaching. As the mathematical acquirements included, among other things, quadratic equations, square and cube root, geometric proportion, and fairly extended mensuration, it is no wonder now that Dr. Sickinger declares the assumption on the strength of which the change was made to be

A Fateful Error.

The wonder is that it took over twenty years to find this out. Indications that something was wrong were soon manifest. In spite of the high ideal maintained by the programme of instruction in force in Mannheim, complaints made themselves heard that children passing from the elementary schools to those of a higher grade were not as well prepared as formerly, and there was a steady falling off in the enrolment of children of the better class. Still more conclusive evidence was afforded by the statistics as to the percentage of children reaching the highest classes. In the years 1877–1887 taken together about half the children who commenced their studies in the first class left school after getting no higher than the sixth class. In 1879–1880 nearly three-fifths of the children who completed their school course in the year had got no higher than the sixth class. The children who thus left school without working through the full course of instruction went out into the world only partially fitted by the school for their work in life. For instance, the work in German for the last two years is specially intended to prepare pupils to express their ideas independently. In history the pupil who did not work through the seventh and eighth years of instruction would leave school with a knowledge of geography confined to Germany, totally ignorant of the history of the last three centuries, of mensuration, and of nature knowledge. In order in some measure to complete the instruction of scholars who left school whilst only having worked through the sixth and seventh classes, special classes called *Konfirmandenklassen* were made of these. In these *Konfirmandenklassen* the work of the years of instruction which the pupils had no prospect of fully taking up was gone through in an abridged form, so that the instruction in each subject should be to some extent rounded off and completed.

The poor promotion results in the Mannheim schools were from time to time the subject of adverse comment in the reports made by the officials charged with the work of inspection, but no important change for the better occurred until the year 1887. The Grand Ducal *Oberschulrat* had already, two years before, expressed the opinion that too much in arithmetic was expected of the children in the lower school years. In 1887 the mathematical work for boys of the later school years was materially lightened, with the result that the promotion statistics assumed a much more favourable aspect. For instance, in 1893–1894, 33 per cent. of the boys who left had gone through all the classes, and 40 per cent. through the seventh class. The importance of these figures is somewhat discounted by the fact that, owing to the constant adverse criticisms of the educational authorities, a somewhat less exacting standard for promotion was taken after the year 1887; but as the milder system of procedure was applied to girls as well as to boys, and as the promotion statistics for girls did not improve, it was only reasonable to assume that the lightening of the curriculum had much to do with the improved boys' results. The conviction that there was

A very Serious Defect

in the Mannheim system grew. Comparisons were made with the promotion results in other important towns in the Grand Duchy. The lessons to be drawn from these comparisons were, however, subject to the differences in school organisation existing between them. Thus in Karlsruhe there existed both the elementary school with the ordinary curriculum and that with the extended curriculum. But while for the five years from 1892 to 1897 the average percentage of boys leaving after completing the eighth class was in Mannheim 30 per cent., in Karlsruhe it was 62 per cent. for the ordinary school and 67 for the school with the extended curriculum. A like disproportion existed in the case of the girls. While the percentage of girls who left after completing the eighth year of instruction was in Mannheim, with its single school system, 19, it was in Karlsruhe 36 for the ordinary school and 42 for the advanced school. To what could these differences be due? Both in Karlsruhe and Mannheim the emoluments of teachers were on a sufficiently high scale to attract candidates with the best credentials, and there was no ground for believing that in Karlsruhe teachers were more lenient with regard to the promotion of scholars. It was true that the Karlsruhe schools were probably frequented by a more homogeneous class of pupils, and that a slightly larger total number of hours was given to instruction there than in Mannheim. It was also true that in Mannheim many of the pupils of the lower years were taught in what was called "combination" classes. These classes were taken in turn by a single teacher, who had to give no less than from 40 to 42 hours of instruction per week without even having a half-day free. As a consequence of this system, these combined classes were committed only to teachers of exceptional physical powers and professional ability. The difficulties mentioned above, in addition to that due to the more migratory character of the population of Mannheim, were insufficient to account for the enormous differences in the promotion statistics of the two towns. The chief cause of the inferiority of Mannheim could only lie in the attempt to force all through a curriculum which could only be satisfactorily mastered by picked children. The solution of the difficulty probably lay in the

Classification of Scholars according to their Capacities.

That a more satisfactory state of things would be arrived at by the adoption of such a course was rendered all the more likely by the experiences of Basel and Zürich. The peculiar geographical position of the former town made it very desirable to add French as a compulsory subject to the curriculum of the elementary schools. This was done for the last four years of the school course, five to six hours weekly being devoted to it. It was found, however, that this was beyond the capacity of the weaker scholars, and the promotion results fell as alarmingly as they had done in Mannheim. It was found necessary to estab-

woman. As a large proportion of the children leave school at 14, the teaching given in the Grade schools is recognised as likely to exert a more important influence on national life than that given in high schools. In many schools the only Domestic Science subjects taught, besides Hygiene, are Cooking and the elements of cleaning. Even these are not taught in rural schools. The chief obstacles in the way of the introduction of these subjects into schools are parental objections, want of accommodation, and the difficulty in co-educational schools of finding appropriate occupations for the boys while the girls are thus occupied. As these difficulties are being gradually overcome, the subject is being increasingly taught.

Girls generally begin cooking lessons in the 6th, 7th, or 8th grade, at the age of 12 or 13. They then generally have one lesson a week. The course usually extends over two years. The length of the lessons varies from 1½ to 2½ hours. The number of pupils in a class varies greatly, from 12 to 40, or even 50. Thus in Washington the course extends over two years, the lessons last an hour and a quarter, and a class consists of 12 pupils. At Toledo the length of the course is two years, of the lessons 1½ hours weekly, and the number of pupils in each class is 30. Want of accommodation makes it often impossible for all the girls eligible for instruction to attend the cooking classes.

The system of centres, to which classes from various schools go for their cooking lessons, is frequently adopted. This system has the advantage of economy of equipment, but makes it difficult to correlate the instruction given with the rest of the school work. Basements are often utilised for the teaching of cookery, with the result that light and ventilation are often defective. New schools in New York City and Washington are provided with special "cooking laboratories," which serve as centres for other schools.

The tables used in cooking laboratories accommodate two or four pupils, or are horseshoe-shaped and accommodate a larger number. They are from 30 to 33½ inches in height, and are covered with hard wood, metal, slate, or tiles. About 6 or 8 inches above the back part of the table runs an iron grid, beneath which are Bunsen gas-burners, or gas-rings Immediately under the tops of the table are two sliding boards, one for bread and one for meat; below these two drawers, one for knives, spoons, measuring-cups, and other smallware, the other for notebooks and recipes. Below the drawers are a metal bin for flour or potatoes, and a cupboard for dishes and bowls. A sliding seat is also provided. A great feature of the cooking laboratory is the dining-room, which is used for table sewing lessons, and for the simple dinner offered to the principal and other visitors, with which many grade-school cooking courses conclude.

(To be Continued.)

A GERMAN SOLUTION OF AN EDUCATIONAL PROBLEM.

BY W. T. THOMPSON, B.A. LOND.

FOR the past two or three years the system of school organisation adopted by the town of Mannheim in Baden has been the object of close study, of warm praise, and of equally violent attack by all who are in any way interested in the work of elementary education in Germany. Many of the teachers' associations and educational experts in Germany have sent delegates to study its practical working on the spot. What Dr. Sickinger, the initiator of the present system, proudly claims as a reform in the organisation of public elementary schools, has attracted to Mannheim expert visitors from France, Denmark, Austria, and Switzerland, so that the town of which he is the educational ruler has been called the "Burgdorf of Germany."

The system adopted in Mannheim has been already definitely adopted by some towns, whilst others have established experimental classes for the purpose of watching its working. A formidable mass of literary effort has accumulated itself round this subject, for the most part discussing it in a critical but fair spirit, but at other times overwhelming the system and its author with those ponderous epithets with which the German language abounds. The question involved can be best discussed by following the order of Dr. Sickinger's exposition of his system, and giving our readers to begin with an account of

The History of School Organisation in Mannheim.

The Mannheim schools are conducted under a highly centralised system. The administrative body responsible for the conduct of educational affairs is the *Schulkommission*, with an Executive Officer, the *Stadtschulrat*, who is practically the Head Teacher of all the seventeen blocks of schools in the town. It is true there are *Oberlehrer*, but as they must teach at least twenty hours per week, they can do very little supervision. None of the seventeen blocks of schools are independent organisations, serving for the entire educational needs of the children of the district in which they are situated. Some of the classes comprising the highest years of school instruction are only found in certain blocks, and many of the subsidiary classes to which, under Dr. Sickinger's present organisation, a child may be relegated, only exist in particular school buildings, so that the locality in which a child receives instruction may change several times in the course of its school life. Thus the Mannheim system, unlike that prevailing here, is not made up of a number of separate schools, each serving the needs of a locality, carrying out practically similar curricula, and for purposes of administration linked together under the control of one committee, but of a single school, carried on in detached buildings, and controlled even down to relatively small points by one powerful will.

Up to 1870 the school organisation in Mannheim was "confessional," or to use our term, "denominational." In that year these various schools were replaced by one school for all denominations, with six years of instruction; and another with a more extended curriculum and a higher fee, having eight years of instruction. At the same time the Preparatory Trades' School was incorporated with the eight-class school, the mathematical instruction given in it being divided out between the last two years of instruction. The instruction in this higher elementary school coincided with the normal course of instruction laid down for all children in the Grand Duchy only in its literary part, but in its mathematical part it went far beyond it, overlapping to a large extent the work done in the Gymnasium. In 1872 the Town Council of Mannheim abolished the six-class school, and made attendance at the eight-class school having an extended curriculum obligatory for all children. The object of making the change was

to allow all children without exception to participate in the benefits of extended instruction. As to the possibility of all children being mentally capable of receiving this extended instruction, it was declared that "the extended scheme of instruction contains no more than what even a child of average ability can with ordinary industry and without special exertion acquire in the eight years of instruction." It was further declared that the course laid down was capable of being acquired by children generally without extra teaching. As the mathematical acquirements included, among other things, quadratic equations, square and cube root, geometric proportion, and fairly extended mensuration, it is no wonder now that Dr. Sickinger declares the assumption on the strength of which the change was made to be

A Fateful Error.

The wonder is that it took over twenty years to find this out. Indications that something was wrong were soon manifest. In spite of the high ideal maintained by the programme of instruction in force in Mannheim, complaints made themselves heard that children passing from the elementary schools to those of a higher grade were not as well prepared as formerly, and there was a steady falling off in the enrolment of children of the better class. Still more conclusive evidence was afforded by the statistics as to the percentage of children reaching the highest classes. In the years 1877–1887 taken together about half the children who commenced their studies in the first class left school after getting no higher than the sixth class. In 1879–1880 nearly three-fifths of the children who completed their school course in the year had got no higher than the sixth class. The children who thus left school without working through the full course of instruction went out into the world only partially fitted by the school for their work in life. For instance, the work in German for the last two years is specially intended to prepare pupils to express their ideas independently. In history the pupil who did not work through the seventh and eighth years of instruction would leave school with a knowledge of geography confined to Germany, totally ignorant of the history of the last three centuries, of mensuration, and of nature knowledge. In order in some measure to complete the instruction of scholars who left school whilst only having worked through the sixth and seventh classes, special classes called *Konfirmandenklassen* were made of these. In these *Konfirmandenklassen* the work of the years of instruction which the pupils had no prospect of fully taking up was gone through in an abridged form, so that the instruction in each subject should be to some extent rounded off and completed.

The poor promotion results in the Mannheim schools were from time to time the subject of adverse comment in the reports made by the officials charged with the work of inspection, but no important change for the better occurred until the year 1887. The Grand Ducal *Oberschulrat* had already, two years before, expressed the opinion that too much in arithmetic was expected of the children in the lower school years. In 1887 the mathematical work for boys of the later school years was materially lightened, with the result that the promotion statistics assumed a much more favourable aspect. For instance, in 1893–1894, 33 per cent. of the boys who left had gone through all the classes, and 40 per cent. through the seventh class. The importance of these figures is somewhat discounted by the fact that, owing to the constant adverse criticisms of the educational authorities, a somewhat less exacting standard for promotion was taken after the year 1887; but as the milder system of procedure was applied to girls as well as to boys, and as the promotion statistics for girls did not improve, it was only reasonable to assume that the lightening of the curriculum had much to do with the improved boys' results. The conviction that there was

A very Serious Defect

in the Mannheim system grew. Comparisons were made with the promotion results in other important towns in the Grand Duchy. The lessons to be drawn from these comparisons were, however, subject to the differences in school organisation existing between them. Thus in Karlsruhe there existed both the elementary school with the ordinary curriculum and that with the extended curriculum. But while for the five years from 1892 to 1897 the average percentage of boys leaving after completing the eighth class was in Mannheim 30 per cent., in Karlsruhe it was 62 per cent. for the ordinary school and 67 for the school with the extended curriculum. A like disproportion existed in the case of the girls. While the percentage of girls who left after completing the eighth year of instruction was in Mannheim, with its single school system, 19, it was in Karlsruhe 36 for the ordinary school and 42 for the advanced school. To what could these differences be due? Both in Karlsruhe and Mannheim the emoluments of teachers were on a sufficiently high scale to attract candidates with the best credentials, and there was no ground for believing that in Karlsruhe teachers were more lenient with regard to the promotion of scholars. It was true that the Karlsruhe schools were probably frequented by a more homogeneous class of pupils, and that a slightly larger total number of hours was given to instruction there than in Mannheim. It was also true that in Mannheim many of the pupils of the lower years were taught in what was called "combination" classes. These classes were taken in turn by a single teacher, who had to give no less than from 40 to 42 hours of instruction per week without even having a half-day free. As a consequence of this system, these combined classes were committed only to teachers of exceptional physical powers and professional ability. The difficulties mentioned above, in addition to that due to the more migratory character of the population of Mannheim, were insufficient to account for the enormous differences in the promotion statistics of the two towns. The chief cause of the inferiority of Mannheim could only lie in the attempt to force all through a curriculum which could only be satisfactorily mastered by picked children. The solution of the difficulty probably lay in the

Classification of Scholars according to their Capacities.

That a more satisfactory state of things would be arrived at by the adoption of such a course was rendered all the more likely by the experiences of Basel and Zürich. The peculiar geographical position of the former town made it very desirable to add French as a compulsory subject to the curriculum of the elementary schools. This was done for the last four years of the school course, five to six hours weekly being devoted to it. It was found, however, that this was beyond the capacity of the weaker scholars, and the promotion results fell as alarmingly as they had done in Mannheim. It was found necessary to estab-

lish separate classes without French, and with a simplified curriculum for these children. The results of this new organisation were of the very happiest description. Somewhat similar steps were taken in Zürich, with an outcome which was equally approved by scholars and teachers. This led Dr. Sickinger to consider whether it was not possible to establish in Mannheim a new organisation, which, while still allowing the more gifted children the advantage of an extended course of instruction, should establish a course for the weaker children which they should be able to assimilate satisfactorily. But it was first necessary to consider

The Bases of the New Classification.

As bases of this reform Dr. Sickinger chose what he considered to be the three principal factors which determine a child's school progress—(1) Natural ability; (2) industry; (3) home circumstances. Each of these factors might be considered in the cases of individual children as existing in degrees which might be summarised as (1) good; (2) fair; (3) unsatisfactory. According as the average mark for the total combined effect of the three factors reached the good, the fair, or the unsatisfactory standard, children would fall into one or other of three divisions representing (*a*) Children who would complete the seventh or eighth year of instruction before leaving school; (*b*) children who would reach the standard of the fourth to the sixth class; (*c*) children who hitherto had left school hardly having acquired the power of reading. As a justification for a division of children according to their capacities, Dr. Sickinger found support not only in the results of the practical experiences of Basel and Zürich, but in ethical considerations and in the opinions of Herbart. On ethical grounds it was unjust to endeavour to force a scholar through a course which he felt to be above his capacity, and a lowering of the course to suit the capacity of the child would cause it to work with greater alacrity and to find pleasure in its work. The great pedagogue counselled that the differences in intellectual capacity existing among children should be considered as implanted by nature, and should be taken into consideration in forming a curriculum. He was also of opinion that children not making satisfactory progress in schools of one type should be drafted into schools of a lower grade. Herbart further recognised that the greatest difficulty the elementary school had to contend with lay in the great differences of intellectual capacity existing amongst the children who frequented it. In view of this difficulty he advised diversity and not uniformity of curriculum, and in emphatic language declared that the pretence of accomplishing much, when much cannot be accomplished, should end. It was too from a hint given by Herbart that Sickinger derived his plan of *Förderklassen*, which will be referred to later.

The New Organisation Described.

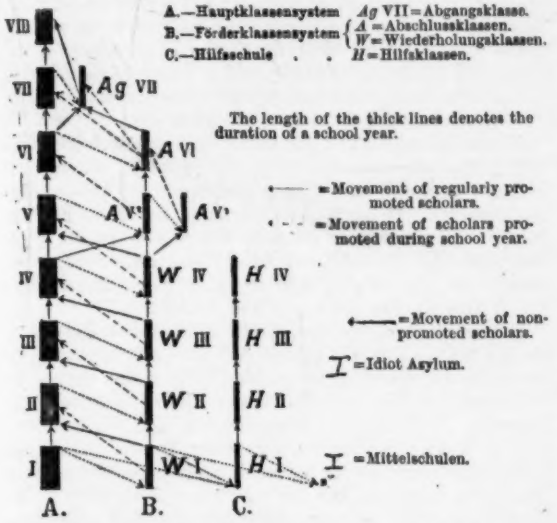
The tripartite organisation founded on the bases mentioned consists of (1) *Hauptklassen* of seven or eight grades for the children averaged as "good"; (2) *Förderklassen* (improvement classes) of five or six grades for the children averaged as "fair"; and (3) *Hilfsklassen* (assistance classes) of four grades for the "unsatisfactory" children. He rejected the idea of separate buildings for the separate grades, and made it a cardinal feature of his system that this should be an organisation within the school walls and not appearing outside them. After Dr. Sickinger had elaborated his new system and brought it before the City Council, he invited the teaching body of Mannheim to consider it. That it was fully debated is evident from the fact that four separate meetings were held to consider it. The proposals were accepted practically *en bloc* by the teachers. On the City Council the opposition came from the Socialists, who saw in the proposals an attempt to secure differential treatment for those who were better situated in an economic sense. They were, however, carried in their main points, and the reforms have from the school-year 1901–1902 been gradually brought into effect. A beginning was also made with the abolition of the two combined classes carried on by one teacher.

According to the new system the children who fail to receive promotion at the end of the first year do not remain in that class along with the new children just entering, but are drafted into *Förderklasse I.* The lowest four of the *Förderklassen* are called *Wiederholungsklassen* (repetition classes), the upper two *Abschlussklassen* (finishing classes). The number of children in the *Förderklassen* averages 35, and in the *Hilfsklassen*, 20. This reduction of the numbers has been obtained without increasing the total teachers employed by increasing the average number of children in the *Hauptklassen* by two. The teachers of the special classes are specially selected for their ability, and as a rule take their children on to the next higher class. A peculiarity of these *Sonderklassen* (separate classes), as Sickinger calls the *Förder-* and *Hilfsklassen* taken together, is the *successive Abteilungsunterricht* (instruction in alternate sections). The children in these classes work for 19½ hours a week, whereas the teacher's working week consists of 26 hours. For 13 hours the class is taken as a whole. For the remaining 13 hours the teacher takes half the class at a time in German and arithmetic. This permits the teaching to become more individual, and in some cases even enables a child to be transferred during the year to the normal class for its age. There is, however, some ground for the objection urged against it that it is likely to lead to mental forcing. Another provision of Sickinger's which is open to grave objection is that the children of the *Sonderklassen* have the first claim to participate in the benevolent organisations attached to the school, such as free meals, holiday homes, &c.

How the System is Worked.

To make this clear we give below Sickinger's diagram showing how the various directions in which children who enter together in the first or lowest class may branch off. We have already mentioned that children who do not get promotion from *Hauptklasse I.* to *Hauptklasse II.* go to *Wiederholungsklasse I.* The curriculum for this class is the same as for *Hauptklasse I.*, but the teacher is empowered to concentrate on the most essential parts of every subject. If a child drafted into the lowest *Wiederholungsklasse* reaches by the end of the year a good standard, he is sent back to the second class in the *Hauptklassensystem*. He may continue in this system, but with no expectation now of getting beyond the seventh class, and with the liability, should he fail to get promotion at the end of any one year, to be sent to the corresponding *Wiederholungsklasse*. If he only reaches a fair level at the end of the year in a *Wiederholungsklasse*, he goes up to the next *Wiederholungsklasse*. If through

sickness or any circumstance not due to mental incapacity he cannot be promoted from a *Wiederholungsklasse*, he remains in that class another year. If the cause of his failure is mental incapacity, he goes to a *Hilfsklasse*. He then either remains in this system, or, if his mental incapacity is total, is transferred to an asylum for idiots. A child may, as a result of an



examination conducted by teacher and doctor, be sent straight from the first *Hauptklasse* to the corresponding *Hilfsklasse*. In the *Hilfsklassen* the curriculum makes still less demands on the mental capacity of the children than in the *Förderklassensystem*. These classes correspond with our special schools for children of low mental powers. The two upper classes in the *Förderklassensystem* are denoted *Abschlussklassen*. In these an abridged course comprising the essentials of the work of Classes VII. and VIII. in the *Hauptklassensystem* is worked through. This is similarly the case with the *Abgangsklasse* marked *Ag VII* in the diagram. This serves as a leaving class for scholars who have once missed promotion, and for girls born between July 1 and December 31, who, by a peculiarity of the Baden school law, only have to attend school for seven instead of eight years. Similarly a girl in the *Förderklassensystem* might only get to *Abschlussklasse V.*, whereas a boy would get to *Abschlussklasse VI.*

We cannot attempt in the limits assigned to us to deal exhaustively with this subject, but conceding there are many points in Dr. Sickinger's system which are open to serious criticism, it must be admitted that while an absolutely ideal classification of children according to their capacities is unthinkable, it is much to be desired, both for the sake of the brighter and the duller children, that there should be some grading in this direction. The greatest objection urged against Dr. Sickinger's system is that a separation of the brighter from the duller children would destroy an incentive to effort on the part of the latter. But experience, both in Mannheim and in Basel, points the other way. The differences between the brightest and the dullest children, instead of stimulating the weak ones, led to them passively assenting to the brighter ones doing all the work. The teachers who have had experience in the German classes of Basel and the *Förderklassen* of Mannheim are emphatic in declaring that in classes of children all admittedly of mental power not above the average there are sufficient differences of mental ability to foster a spirit of emulation and to stimulate the less willing and duller members of the class. It has been found too that children relegated to the classes having lower aims attend school more willingly and take greater pleasure in their work. In Mannheim the only objection raised to them by parents has been on account of the great distance some children have to go, because all the units in each of the parallel systems do not exist in every school block. On the other hand, there have been many cases where, when children in the special classes have removed to a distant part of the town, they have asked to continue attending the particular class they have been at.

RELIEF OF UNDERFED CHILDREN.

CONSIDERABLE interest has been excited lately in the question of underfed school children. It is one that presents many difficulties. Teachers in poor districts know only too well that it is impossible to teach a child who is suffering the pangs of hunger, and much has been done by teachers to help the little ones, both by giving from their own pockets and by organising and laying out to the best advantage contributions given by the charitably disposed. The East Lambeth Teachers Association, under the guidance of Messrs. Libby and Chell as secretaries for this branch of the association work, has helped a number of poor children, which would appear incredible to any one who did not know the south of London. Many other associations have been carrying on this benevolent work in a quiet, unostentatious manner.

It has been felt that the evil is too great to be met by charity alone. In some cases, moreover, parents may have been tempted to neglect their children in the assurance that their meals would be provided gratis at school. The matter has received the careful attention both of the Board of Education and of the Local Government Board, and each department has sent out a circular.

The Local Government Board has addressed the Guardians of the Poor, pointing out to them what their statutory powers are in the matter, directing that on receipt of a "special application" to a Relieving Officer from the Managers, or a teacher duly empowered by the Managers, of a Public Elementary School, or an officer duly authorised by the Local Education Authority, the Guardians shall take steps to ascertain whether or not the allowance of relief is, or is not, rendered necessary by the habitual neglect of the father to provide adequate food for the child. Any relief given in such a case is to be considered as a loan, and before such relief is given they shall take all practicable steps to induce the parents to make proper provision, but if it becomes necessary for the Guardians to make the provision the expenses are recoverable at law as a loan to the father.

An application for relief in this form shall not hold good for more than a month.

When help is given in this way and treated as a loan the Guardians cannot require the father to attend the Workhouse to receive relief there, or to do work in return for the relief.

Proceedings may be taken against a defaulting father under either the Vagrancy Act of 1824, or the Prevention of Cruelty to Children Act of 1904.

The Circular from the Board of Education calls attention to the preceding, a copy of which is sent with it, and gives advice to Local Education Authorities on the subject. It points out that a child may be sent to school without proper nourishment (1) because the parents are permanently impoverished, or (2) because temporary illness, loss of employment, or other unavoidable causes, have for the time incapacitated the parents from making necessary provision for the child, or (3) because the parents, though capable of making this provision, have neglected to do so.

The Board feel that the second of these groups of cases will provide the most suitable field for the valuable work done by the various voluntary and charitable agencies which exist for the provision of meals for children who are sent to school hungry.

Cases coming under the first or third category may be proper subjects for a *special application* to the Guardians or Relieving Officer; but unless the case is so urgent that it must be dealt with immediately, special application should only be made after careful inquiry into the circumstances by those making the application, in order to ascertain to which class they belong.

The circulars seem to us to afford a very satisfactory means of dealing with the matter. The children can be properly fed, neither they nor their parents need lose their self-respect, parents who are culpably negligent can be brought to book, and the charitably disposed can find suitable channels for their gifts.

The great thing is to treat the question calmly—not to make a political cry out of the matter, nor to deny the evil. At the same time all exaggeration should be avoided, and the general public should not be led to believe that every school is crowded with starving children. That there is a danger of the tender-hearted being misled in the matter is shown by the Headmaster of a Pupil-teacher Centre who found a lady depositing crusts on the window-sill just by the entrance. When asked what she was doing the good soul replied: "Oh, I was putting some pieces of bread here for the poor little beggars when they come out."

EDUCATION IN SOUTH AFRICA.

Article III.

The Education System of the Transvaal.

THE education system of the Transvaal differs somewhat from that of Cape Colony. The lines on which the work will ultimately be carried on have up to the present been only broadly defined; details in carrying out the system have undergone many changes and modifications in the past three or four years, and may naturally be expected to undergo still more changes and modifications in the next few years.

Such a state of apparent indecision and uncertainty is unavoidable, since time and experience alone can justify the formulation of a settled system of education in a new country. Method of procedure in education and an education code must, like the constitution of a new country and its laws, be tentative and experimental at first; the needs of a new country grow and change, and this growth and change must be taken into account in estimating, let alone in criticising, the present education system in the Transvaal. Hence any remarks made in this article must be taken to be a straightforward statement of education work in the Transvaal during the past three years, as it impressed one who has lived and worked there during that period.

To resume the subject of my article—

Classes of Schools. — There are in the Transvaal practically *two* classes of schools: (*a*) *public* schools, or those entirely under Government control, irrespective of the class or social standing of the child educated in them, and (*b*) *private* schools, which are schools merely under Government inspection, and in no way dependent on Government for financial support or aid.

Public Schools.—The public or Government schools, again, are of two kinds: (*a*) *free* schools, where no fees are charged, and where, consequently, the whole maintenance of the school depends on Government grants; (*b*) *fee-paying* schools, where the pupils pay fees, and the Government subsidises these fees to a greater or less extent, and so is, in part, financially responsible for the upkeep of the schools.

The public schools are, further, of three different kinds: (*a*) *town* or *city* schools, (*b*) *mine* schools, and (*c*) *farm* schools, according to the locality in which they are.

Grading in Schools.—In towns like Johannesburg, Pretoria, Potchefstrom, Krugersdorp, &c., all schools, both *free* and *fee-paying*, are fully graded, that is, have arrangements for educating children from five years and upwards, the school course terminating in many cases with the Cape Matriculation Examination, thus carrying the pupils up to the entrance examination for a college or post-school course. In some of the smaller towns, such as Standerton, Heidelburg, &c., the *fee-paying* school is closely connected with and a kind of sequel to the *free* schools, and is arranged for the education of older children mainly.

In the mining districts there are *central* schools, usually found on the largest mine property. (These schools are fully graded.) And on the smaller mines are *junior* schools, carrying the children up to Standard III. and thereabouts. The older children from these different mines attend the central school. The children are conveyed from school by train, cart, or they ride on horseback.

The *farm-schools*, as their name denotes, are found on farms, and are for the education of all children living too far from another school to attend regularly.

Virtually, there is no class distinction in the schools. They are open to all children of the district; no special social stigma attaching to children from attending any particular school, whether *fee-paying* or *free*. This is notably the case in the smaller towns and mine districts, whilst in the larger towns, where there are several schools of both classes (*free* and *fee-paying*), the locality in which the school is placed stamps it *socially*.

In considering such a point as this it is well to bear in mind that there are no poor white people in the Transvaal, as we think them in England. That section of the community are represented by the natives, or coloured people, and for them special schools are provided.

Dutch Schools.—There are Dutch schools in different parts of the Transvaal, where the medium of instruction is Dutch—English being taught as a foreign language. These schools belong to the Dutch Church or to Dutch committees, and are supported by members of that community and by scholars' fees.

Native Schools.—As before stated, special provision

is made for native education. Native schools belong to different religious bodies, and are under the immediate control of the clergy or of different ministers of religion. The teachers are mostly natives, and the schools are inspected by a special Government inspector. The work is quite in its infancy in the Transvaal as compared to the work done for native education in Cape Colony. This branch of education work offers a wide field for the missionary and for the educational enthusiasts. The lines on which the work is to be carried on are as yet somewhat indefinite. Mr. Sargent, Educational Adviser, has been for some time travelling widely in South Africa for the purpose of studying the problem of native education; hence, one may hope ere long to see this branch of education work much developed and more permanent.

Special Schools.—So far as I know, at present there are no "*Special Schools*," *i.e.* schools for defective children, in the Transvaal. Doubtless this branch of the work will receive due attention a little later on.

Orphanages.—In different parts of the Transvaal there are orphanages for children who have lost their parents in the last war; here children are educated, as well as housed and fed. These orphanages belong either to the Dutch Church or to Government, and are respectively supported by one or the other.

Private Schools.—Private Schools in the Transvaal are not very numerous. In towns like Johannesburg, Pretoria, Potchefstrom, and Krugersdorp there are schools of this description. The Roman Catholic Sisterhood have some excellent schools for girls, and the Marist Brothers some good schools for boys. The Church of England has also its own boys' and girls' schools, but they are small schools, except the Church of England boys' school at Pretoria, which is a very flourishing one.

In Johannesburg there is a branch of the well-known *Rhodean School, Brighton*, with a Miss Laurence, a sister of the Brighton Principal, at its head. There is also an excellent private High School for girls.

St. Andrew's High School.—The Principals are Miss Johnstone and Miss Fletcher, who are quite pioneers in this branch of work. They have done in the past and will increasingly continue to do so in the future very real service for girls' education in the Transvaal; to their initiative we owe a Transvaal centre for the Oxford Locals.

St. Mary's College, lately moved into new buildings at Belgravia from Jeppetown, is also a flourishing girls' school of the high school type; Miss Holmes as the Principal is well known in Johannesburg. Before the war this school stood alone practically, it is interesting now to see it holding its own against many rivals.

Government has the right of inspecting all private schools, and of insisting on good qualifications for teachers, &c.

During the last fifteen months the *Transvaal Technical Institute* has been opened. The mining school from Kimberley has been removed to Johannesburg; this place, from its central position on the Rand, offering very special facilities and educational advantages for mining students. Professor Hêle Shaw from Liverpool is at the head of the Institute. The Institute, it is hoped, will be the nucleus of a *Transvaal University*.

Teachers' Qualifications. A Normal College is at work at Pretoria; Mr. Adamson is Principal. The work is still in its infancy, although a good start has been made. Thus far the work done at the Normal College has been chiefly academic; the purely professional work has not been the main feature of the College. This could not well be otherwise perhaps, seeing how indifferently prepared many would-be students were. The broken education many of them had received, due to the interruption of a four years' war, made it impossible to expect a very good entrance standard, although the standard is being raised each year. Valuable, however, as the work of the Normal College has been thus far, it is quite insufficient to supply the definite and prolonged training so essential to the making of a competent teacher, particularly for the junior children.

For many a year teachers for junior classes will be much needed in the schools, since this part of a school is far and away the largest. The upper classes are less well attended, because the children leave school much earlier as a rule than in England, and those children whose parents can afford to prolong the school years often send them home to the mother country for the final years of their school life. The lack of special training for infant work at the Normal College is a serious defect, which we must hope to see remedied shortly. Some attempt has been made, by holding classes for acting teachers in Johannesburg, Pretoria, and on the Rand, for instructing teachers in infant methods, and by holding a special examination for those who have attended the classes.

Staffing of Schools.—The public schools are well staffed on the whole. The *Principal* of every full-grade school, with here and there an exception, is a man; he is assisted by trained scholars, male assistants for the upper standards or classes, and by female teachers for the lower standards or classes. Each assistant is responsible for a class, generally a large one in two divisions. This result holds good for *junior* and *infant* classes as well. Teachers are professionally qualified for their work. There are no pupil-teachers. The pupil-teacher system is not in vogue in the Transvaal. There are some exceptions, and here and there teachers are employed who possess no professional qualifications. They retain their posts because of good practical work done in the past or in the concentration camp schools. Opportunities, however, are being offered them for improving their qualifications.

Mine and Farm Schools have, as a rule, a lady as Principal, assisted by one or more female assistants. The principal of a school in a small town or of a *central mine* school ranks as a district head-master; that is to say, he exercises some jurisdiction over the surrounding junior schools. Being more or less on the spot, he is useful as a referee in emergency cases, when, owing to distance or difficulty of transit, it is no easy matter for an inspector to keep in very constant touch with all the schools in his district. The district head-master also visits the junior schools under his jurisdiction, and does much to help to bring about some degree of uniformity in teaching methods and work standards.

Teachers' Nationalities.—One interesting point in the education work in the Transvaal, and yet one which increases the difficulty of the work, is the fact that teachers are drawn from so many different parts. The sister colonies, Australia, New Zealand, and Canada, as well as England, Scotland, and Ireland, all sent contingents of teachers to the *concentration camp schools*. Many of these teachers stayed on after the close of the war, and are working in the schools side

by side with colonial and Dutch teachers. It can easily be understood that when the staff of a school represents many different countries and teachers trained so diversely for their work, it requires some tact and a considerable amount of oversight to bring about cohesion in the work, and to effect some degree of uniformity in methods, without which the children, particularly the younger ones, would suffer much.

Scholars.—The co-education of boys and girls is the rule in the Transvaal, and it works well. There are, of course, in places like Johannesburg and Pretoria, special boys' and girls' schools, but such schools are the exception and not the rule.

School Hours.—There are not very many boarding-schools at present; the children are day scholars. The hours are 5 for older pupils and 4½ for juniors, exclusive of play-time. Schools open, as a rule, at 8 or 8.30 A.M., and close either at 2 or 3 P.M. Some schools break the time up into two sessions, and others take the hours in one session; the locality and other exigencies deciding how the time shall be divided. Lessons are often taken in the open. The new schools are well ventilated now, open doors and windows being the rule rather than the exception. The heat is great at times, but not very oppressive in the Transvaal.

School Buildings, Materials, &c.—New school buildings are being put up as rapidly as funds, building materials, and labour will allow. Few schools are held in tents now. The demand for school accommodation has been great, but it is being met as quickly and as completely as possible.

School furniture and school material have been difficult to obtain, and the want of these things has crippled the work somewhat; each year will see these difficulties lessen. The good work done in the past, in spite of such difficulties as I have just named, is most creditable to the teachers, and augurs well for the standard of work which will be attained in the course of a few years.

Play-grounds are attached to all the permanent schools, and new school games are being organised, cadet corps started, drill and physical exercises well attended to, gardening, too, is encouraged, and in some schools is quite a feature. School libraries and museums are being started. Thus the authorities are doing all that is possible to make a real all-sided education possible and general in the Government schools.

Inspection.—The Transvaal is divided into inspectoral circuits, each under one or more inspectors. Inspectors are responsible for the general oversight of the schools, and for seeing that the Government requirements are complied with as far as possible under existing conditions. School principals have considerable freedom in working up to the requirements of the provisional code which has been in work for some two years. There is every chance for real initiative and for original work. The inspectors are, as a body, sympathetic and desirous of doing their part of the work intelligently and of recognising good work in school on the particular lines of that special school.

There are special inspectors and instructors and instructresses for manual work, domestic economy, and junior work and drawing, but, of course, the teaching of these special subjects is yet at the start. Time must be allowed to place the teaching on a really firm basis, and to adapt it to the real needs of the Transvaal schools.

School Examinations.—Thus far the examinations of the Cape University, School Higher Elementary, Matriculation, are those worked for chiefly in the school. In some cases the home examinations (such as College of Preceptors, Oxford Locals, Trinity College of Music) are entered for.

The principals of the schools hold periodical examinations and an annual examination, and upon these results promotions are made. The inspectors' reports are supplementary to these examination results, and deal more with general efficiency than with individual fitness and acquirements.

Teachers' Lives.—Teachers in town schools have quite pleasant times, work is over for the day at latest by 3 P.M. Saturdays and Sundays are free days.

Much friendliness is shown to teachers and there is a good bit of social life, so that it is a teacher's own fault if the life is lonely and uncongenial.

Life on some of the outlying farms and mines is more lonely and monotonous, and in some cases distinctly a rough one; but even this life has its compensations to any one fond of country pursuits and interested in experiencing life under new conditions. And this life is particularly attractive to the teachers imbued with a truly patriotic spirit, in the opportunities it offers for lessening racial feeling and helping to settle small difficulties consequent upon a long war. Here again everything depends on the individual; his or her personality, conduct, and life are the important factors, and it is well to remember that respect for the English as a nation will depend largely and grow out of respect for the English as individuals. Further, one needs to remember that loyalty to one's king and country does not show to advantage by aggressive conduct and frequent verbal assertions of superiority on the one hand, nor by pandering to obsequiousness to those one lives with on the other, but by a quiet daily doing of one's duty, by a spirit of kindliness and helpfulness, and by respecting the religious convictions and practices even when they differ from our own. The holidays are much the same as in our elementary school at home, four to five weeks' summer holiday at Christmas, three to four weeks' winter holiday in June and July, and one week at Easter—autumn—and one in the spring—September—and all the public holidays. It is much easier now than it was to find homes. The cost of living varies from £8 to £10 a month, and £12, 10s. to £15 a month is an average starting salary. From a monetary point of view teachers are better off in the Transvaal than at home; the work too is more varied, and to the earnest teacher it is a great incentive to feel there is real opportunity for doing individual work, and work that must distinctly tell on the nation.

The *climate* is good; there is little if any rain during the winter—March to August—dust-storms being the one drawback to one's pleasure. The mornings and evenings are often very cold—fires are needed and warm woollen clothing—but the beautiful sunshine makes life quite delightful. The summer months, September to March, are distinctly hot. There are, however, constant thunderstorms, and they clear the air to prevent the oppressive heat so often experienced in tropical countries. It is possible now to purchase any necessaries in the way of food, clothing, or furniture in almost every town, and to obtain luxuries of all kinds as well in the big towns. Of course, things cost more than at home, and there is not quite the same variety.

Our Modern Language Section

FRENCH PRIZE COMPETITION.

RULES.

1. All translations should be **posted not later than July 8, 1905**, and addressed:—PRIZE EDITOR, Office of the *Practical Teacher*, 35 and 36 Paternoster Row, London, E.C.
2. Competitors should cut out and send the Coupon which appears on the Back Wrapper page of the current number.
3. Competitors should write pseudonym only on MS. Prize-winner will be asked to send name and address for publication.
4. No competitor may take the prize offered more than once in three months.

A Prize of Half a Guinea is offered for the best rendering into English of the following extract:—

"Comprenez donc que notre goût moderne sera aussi passager que l'antique; ce qui veut dire qu'il est justement aussi raisonnable et aussi sot. Nous avons le droit d'admirer les sites sauvages, comme jadis on avait le droit de s'ennuyer dans les sites sauvages. Rien de plus laid qu'une vraie montagne au dix-septième siècle. Elle rappelait mille idées de malheur. Les gens qui sortaient des guerres civiles et de la demi-barbarie pensaient aux famines, aux longues traites à cheval sous la pluie et dans la neige, au mauvais pain noir mêlé de paille, aux hôtelleries boueuses empestées de vermine. Ils étaient las de la barbarie, comme nous sommes las de la civilisation. Aujourd'hui les rues sont si propres, les gendarmes si abondants, les maisons si bien alignées, les mœurs si paisibles, les évènements si petits et si bien prévus, qu'on aime la grandeur et l'imprévu. Le paysage change comme la littérature: elle fournissait alors de longs romans doucereux et des dissertations galantes, elle fournit aujourd'hui de la poésie violente et des drames physiologistes. Le paysage est une littérature non écrite; il est comme elle une sorte de flatterie adressée à nos passions, ou de nourriture offerte à nos besoins. Ces vieilles montagnes dévastées, ces pointes blessantes hérissées par myriades, ces formidables fissures dont la paroi perpendiculaire plonge d'un élan jusqu'en des profondeurs invisibles; ce chaos de croupes monstrueuses qui s'entassent et s'écrasent comme un troupeau effaré de léviathans; cette domination universelle et implacable du roc nu, ennemi de la vie, nous délasse de nos trottoirs, de nos bureaux et de nos boutiques. Vous ne l'aimez que pour cette cause, et cette cause ôtée vous y répugneriez autant que Mme. de Maintenon.—De sorte qu'il y a cinquante beautés, une par siècle.—Certainement.—Alors il n'y en a point.—C'est comme si vous disiez qu'une femme est nue parce qu'elle a cinquante robes."

HENRI TAINE.

RESULT OF THE JUNE COMPETITION.

The prize is awarded to "Agaznog." (Will "Agaznog" kindly forward name and address for publication?)

First Class.—Mikado, Peggotty, St. Regulus, Chaos, Shakspere, Barberton, Norse, Maxwell, Lemuel Gulliver, Oliver Twist, Nil Desperandum, Gipsy, Stay-at-home, Josiah, Baldur, Trente-et-un, Kilwhang, Carpe diem, D.S.G., Gabrielle, Zodiac, Letter clip, Ruy Blas, Adlitam, Hiawatha, Patricia, Harmsworth, L.S.B., Caudebec, Renée, L'avare, Iota, Paysan, Bees, Beelzebub, Awa Maru, E.D., Ceylon, Alma, Guillaume, Woodbine, Le chevalier d'Artagnan, Leo, Beta, Josephine, E.M.B., Hope, K.C.S., Patricée, Carissima, Kler, Conway, Jabberwock, Nana, Cæsar, Nomad, Lily of the Valley, S.A.G., Clio, Bracebridge, La débutante, Hirondelle, Mr. Micawber, Osborne, Gobaith.

Second Class.—Irene, Jacques, Try again, Chercheuse, Shylock, Sand Haven, Sib, Ernestine, Tatcho, Lily, Katze, Woolley, Les Haies, Crystal Palace, V.W.X., Work and Win, Mozart, Seconde, Togo, Première, Pisistratus, Marie, Siskin, Monavista, Polly, Troisième, Henriette, Wingrove, Premier Cinque Port, Vassy, Montagnard d'Ecosse.

The name and address of "Nella," who won the prize for May, are:—Miss Lucy V. Shaw, 1 Coppice Lane, Quarry Bank, nr. Brierley Hill, Staffs.

Report.

We have again to complain that there are very few papers of any striking merit, but looking back some years we are very forcibly impressed with the higher average merit of the papers we now receive. An increasingly large number of competitors make it their aim to translate into English not so much the words and phrases of the French text as the ideas it conveys. In last month's extract *comme* was by many students translated as "like." *Comme* here means "as," or better still, as the prize-winner puts it, "viewed as." *Universels* refers both to *rhythme* and *prosodie*. *Postulation de nerfs* is a bit puzzling, but that does not excuse three competitors for translating as an "application for dispensation of the nerves."

Prize Translation.

Pure intellect aims at truth, or has truth for its term. Taste shows us beauty, and the moral sense or conscience teaches duty. It is obvious that taste, which may be named a medium sense, is intimately connected with the extremes intellect and conscience, from which latter it is parted by so slender a barrier as to lead Aristotle to unhesitatingly raise some of its most delicate operations even to the ranks of the virtues. It is its deformity, its disproportion, which makes vice so abhorrent to the man of refined taste. Vice aims a blow at what is just and true, revolts the intellect and the conscience; but, viewed as a violator of harmony, as a discord, it wounds more especially certain poetical natures, and I do not see any cause for scandal in viewing all infractions of morality, of moral beauty, as a kind of offence against universal rhythm and prosody. It is this admirable, undying sense of the beautiful which makes us regard the earth and its phenomena as a transient view of, an intercommunion with Heaven. Nothing more vitally proves our immortality than our insatiable thirst for all that is beyond our life and which it veils. It is, at the same time, by poetry, and through it, by and through music, that the soul snatches a glimpse of the glory beyond the grave. And when an exquisite poem makes the tears surge to our eyes, these tears betoken no excessive enjoyment; they rather witness to an irritated sadness, an appeal of the nerves, a nature exiled in an imperfect sphere yearning to be possessed at once, even on this earth, of a completely disclosed paradise.

AGAZNOG.

UNIVERSITY OF LONDON.

MATRICULATION EXAMINATION.

JUNE, 1905.

FRENCH.

Examiners { J. G. ANDERSON, Esq., B.A.
{ ELPHÈGE JANAU, Esq.

THURSDAY, June 8.—Morning, 10 to 1.

I. Translate into English:—

A.—*Un Quartier de la Valette.*

La rue que nous longions était suffisamment large et propre. Rien ne faisait deviner le voisinage de tant de misère. Tout à coup, notre guide tourne à gauche, s'enfonce sous un porche. Nous le suivons. Le porche conduit à un escalier étroit, tournant entre des rangées de maisons si rapprochées que, de nos deux mains étendues, nous touchons les deux façades. Il semble que nous descendions dans les entrailles de la terre. Les pieds glissent sur une boue qui ne doit jamais sécher, sur des restes de légumes, de fruits, de cuisine, qui pourrissent dans ce gouffre bâti, et que personne n'enlève. L'air est lourd, humide. Au-dessus des murs, très haut, on aperçoit une mince bande de ciel, d'un ciel très éloigné, qui n'envoie aucun souffle, aucun rayon joyeux jusqu'à nous. On se sent enveloppé, dominé, écrasé par les quartiers des riches, construits sur les collines, et qui prennent, eux, toute la bonne brise, toute la bonne lumière. Bientôt, autour de nous, les ruelles se croisent, toujours tournantes. Nous sommes au fond, sans doute au-dessous du niveau de la mer. Les habitants font leur toilette, peignent leurs enfants, battent leur literie, cuisent leurs tomates à la graisse, raccommodent leurs souliers ou leurs bas en public. Ils sont assurés que pas une voiture nes les troublera.

B.—*Appareillage.*

Quand le navire est prêt pour sa course lointaine,
Que tous les passagers sont arrivés à bord,
Et que la brise est bonne à qui s'en va du port:
"Levons l'ancre et partons," dit le vieux capitaine.

Alors les matelots, au cabestan de chêne,
Avec un chant plaintif, avec un rude effort,
Tirent, tirent longtemps la longue et lourde chaîne
Qui s'attache avec l'ancre au sable qu'elle mord.

Je comprends, matelots, pourquoi ce chant est triste,
Et je comprends aussi pourquoi l'ancre résiste,
Ah! c'est qu'elle s'accroche à tout le cœur humain:

Au tranquille rivage, à la vieille demeure,
A l'épouse, au berceau de quelque enfant qui pleure,
Et qui la tient encor dans sa petite main!

II. *Either* (a) Translate into French:—

"My father once made us keep a diary in two columns; on one side we were to put down in the morning what we thought would be the course and events of the coming day, and at night we were to put down on the other side what really had happened. It would be to some people rather a sad way of telling their lives" (a tear dropped upon my hand at these words)—"I don't mean that mine has been sad, only so very different from what I expected. I remember, one winter's evening, sitting over our bedroom fire with Deborah—I remember it as if it were yesterday—and we were planning our future lives, both of us were planning, though only she talked about it. She said she should like to marry an archdeacon, and write his charges (=*mandements*); and you know, my dear, she never was married, and, for aught I know, she never spoke to an unmarried archdeacon in her life. I never was ambitious, nor could I have written charges, but I thought I could manage a house (my mother used to call me her right hand), and I was always so fond of little children."

N.B.—*Candidates who take the* (b) *alternative are reminded that the* (a) *alternative is the standard to be aimed at both as regards quality and quantity.* Mere padding and idle repetitions should be avoided.

or, (b) Write in French an essay of about 20 lines (*i.e.* about 200 words) on *one* of the following subjects:—

The foreign nation you most admire.
The most desirable qualities in a magistrate.

III. Grammar.

1. Give in columns:—
   (a) The 2nd pers. plur. Imperfect Indicative of *doit, enlève, aperçoit, sent, sommes, font, va, comprends, tient.*
   (b) The 3rd pers. sing. of the Preterite (=past definite) of *longions, doit, pourrissent, sommes, font, battent, troublera, va, tient, mord.*

2. Re-write the part of extract A from *Tout à coup* (line 2) to *de la terre* (line 7), changing *nous* into *je*, *guide* into *guides* (plur.), *tourne* into the past definite (=preterite), and putting the other verbs into the preterite or into the imperfect as may be necessary.

3. Translate into French:—
   (a) Have you finished reading the book my brother lent you last week?
   (b) No, not yet. Does he want it? I'll bring it to-morrow.
   (c) Don't trouble. But when you have done with it, let me have it, please.
   (d) Alfred has told me something of the story, and I should like to read it.

4. Translate the following sentences into French, giving very briefly your reason for your rendering of the words in italics:—
   (a) I have already said *that that* woman and *that* child are not *those* I saw yesterday.
   (b) *It* is not *that* I doubt *what* you say, but *he that* told you was mistaken.
   (c) *This* book is not *the one that* I showed you yesterday.

5. Ecrivez en français, en deux colonnes (Voir A et B), (a) les questions, (b) les réponses à ces mêmes questions, remplaçant les mots français en italiques par des pronoms:—
   (a) (What) les *quartiers des riches* prennent?
   (b) (Where) les *habitants* font leur *toilette*?
   (c) (Of what) ils sont assurés?
   (d) (Why) le capitaine dit: "levons l'ancre et partons"?
   (e) (What) s'attache *au sable*?

CODE OF REGULATIONS FOR CONTINUATION CLASSES.

IN the rearrangement of the administration of education, the instruction of those who have left school (elementary or secondary), whether in general knowledge, in subjects of Science and Art, in Commercial subjects, or in any special subject proved to be useful for the student, has been brought under rules and regulations contained in this code. This Code replaces the former Evening School Code and the Science and Art Directory in so far as it related to evening classes.

The classes may be held at any time of the day, morning or evening, and instruction may be given either in single subjects or in groups of subjects.

There is no restriction of age, but pupils on whom grants are paid must be free from the obligation to attend school in terms of the Education Acts. While pupils on the registers of schools under the Day School Code (including Supplementary Courses and Higher Grade Departments), or of secondary schools may be admitted to certain of the classes, their attendances at the Continuation Classes may not be reckoned for grant.

Pupil teachers may likewise be admitted to any of the classes, but (having in view the grant paid on account of their instruction under Article 19 E of the Day School Code) their attendances may not be reckoned for grant except at classes specially sanctioned for the instruction of pupil teachers in Science and Drawing under Division II.

The grants to certain Technical Colleges and Special Institutions of various kinds will be made on the basis of special minutes applicable to each case.

OUR HOLIDAY SECTION

PRACTICAL TRIPS FOR PRACTICAL TEACHERS.

IN the matter of holidays as in so many other questions the Editor has to thank the many kind readers who have come forward with offers of help to their confrères who need advice. Space will allow us to give only three papers at length, but we trust that the following brief hints will be found useful to those who are considering the best way of spending a holiday.

There are many ways in which a person may be "penny wise and pound foolish," and niggardliness in the matter of holidays is one of them. Teachers' pensions have not been provided on a very generous scale, and hence savings have to be jealously guarded, alike for their future use and for their present interest. But after all, sound robust health must be regarded as another form of capital, and a fairly liberal outlay on holidays is often more than balanced by a saving in doctors' bills. We do not of course imply that the most expensive holiday is necessarily the most beneficial, and that is our excuse for suggesting some means of securing a really good holiday at a low price.

From Messrs. Ward, Lock, BRUGES, FROM "SWITZERLAND GUIDE." *and Co.'s Guide Books.*

Switzerland has been styled the "playground of Europe," and we gladly recognise all that has been done by Nature and Art to render the country attractive to the holiday-seeker, but still we are inclined to give Norway and Sweden the preference. The mountains are nearly as high, but as the valleys are more deeply cut, the heights are more imposing, while the superiority of Scandinavia in the matter of water is incontestable. The charm of any scenery is enhanced by the water in it. How many people can sit for hours and gaze at the sea, which presents nothing but a broad expanse of water! The fjords of Norway are a feature absolutely unrivalled in any other country. Those who are familiar with the southern end of Lake Lucerne can form some idea of the grandeur of the scene in which rugged mountains rise sheer out of the water: that is a character of Norwegian coast scenery, but it has unwearying variety. The valleys are narrower than the Swiss ones, having been grooved out by glacial action, and are often continuous in character with the fjords. Above not only are there snow-covered peaks to be seen, but whole masses of tableland are covered with snow and form vast snowfields. These in summer supply voluminous torrents which rush down the valleys and form grand cascades and cataracts at every change of level; frequently they spread over a broad surface of rock and form a fall of surpassing beauty, as in the case of the Espelandsfos near Odde. To such an extent is water lavished on the scenery in Norway that Switzerland seems a dry country in comparison.

The first time the writer visited Norway the country was only beginning to be opened up to visitors, and the paper on "A Tramp across Norway" gives an idea of the way one had to "rough it" in those days. On one occasion we walked for four days without seeing a carriage road, and we have walked for a whole day without seeing a man or a house. The only available accommodation was often a *sæter* or hut used by the

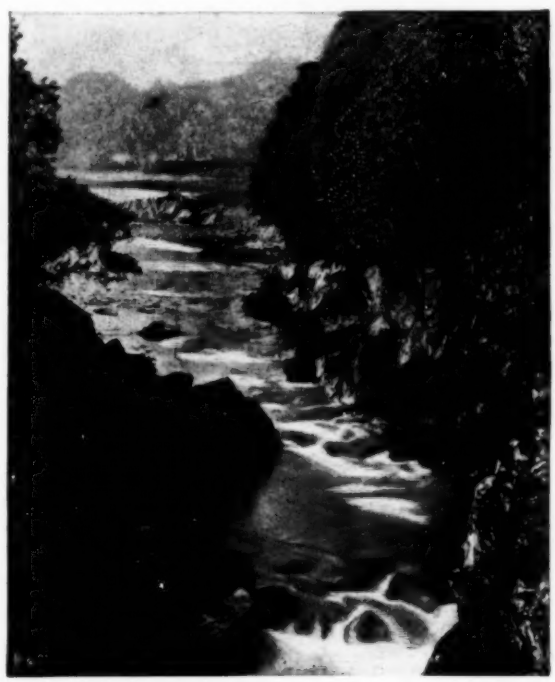
DEVIL'S BRIDGE, ABERYSTWYTH.
(From Messrs. Ward, Lock, and Co.'s Guide Books.)

herdsmen in the upland summer pastures, and it was often necessary to carry a whole day's provisions. But "*Nous avons changé tout cela*," as Sganarelle says; thanks to the *Norske Turistforening* or Norwegian Tourist Union, and the enterprising firm of Thomas Cook and Sons. The former has done wonders in improving means of communication and accommodation, and the latter by bringing the tours within the reach of English visitors of moderate means.

We have received a list of the tours in Norway and Sweden which have been arranged by Messrs. Cook, and can strongly recommend our readers to avail themselves of the opportunities offered. Since the fjords are the most characteristic features of Norwegian scenery, it is perhaps as well to visit those first. These are covered by Tour 3, which includes Bergen (with its interesting fish-market, in which the fish are sold alive from troughs), the Sogne Fjord, and Nærõfjord—one of the most enchanting. Passengers will land at Gudvangen and drive up the celebrated Nærödal, one of the grandest in the world, for even Americans admit that this valley runs the Yosemite Valley very close, although the Yosemite Valley is formed of sandstone rocks of different tints, while the Nærodal shows bold masses of grey felspar. A zigzag road at the head of the valley leads up to the Stalheim Hotel, where the party will spend the night. A more glorious spot cannot be imagined, and the glimpse of inland scenery that this part of the journey affords the traveller will undoubtedly whet his appetite and lead to his following one of the other tours another year. A charming drive leads down to Vossevangen and Eide, where the steamer which goes round the Hardanger and Samle Fjords will be waiting for the travellers and take them on to Odde. If the tourist thinks of extending his visit—and one advantage of Cook's tours is that modifications and extensions are easily arranged on giving notice—he cannot do better than spend a week at Odde. The ordinary tour includes a drive up the valley to see the Lotefos and Espelendsfos (*i.e.* Bridal Veil Fall), but this by no means exhausts the attractions of this delightful centre. A day should be devoted to the Skjaeggedalsfos, one to the Buerbrae, and the Lotefos will improve on a second visit, and the drive —or walk for the vigorous pedestrian—should be continued beyond Seljestad to Röldal, and majestic Gorvingane will repay all the trouble taken, as it is the quintessence of all that is characteristic in Norwegian scenery. The tourist may also climb the steep ascents to the west and survey the Folgefond—a snowfield covering about 350 square miles—whose edges adorn the summits that skirt the fjord.

The tour finishes by a drive to Röldal, described above, a run by steamboat down the Suldals Vand, a drive to the sea-coast at Sand, a visit to Stavanger, and the voyage by steamer back to Newcastle. The whole of this is carried out in first-class style for fifteen guineas.

Tour No. 1 follows very closely the route described in the "Tramp across Norway," but in the latter case a good deal of cross-country work was included. The traveller goes from Hull to Christiania, where a very enjoyable time can be spent; then partly by rail and partly by the celebrated Dalen Canal, which, like the Caledonian Canal, consists largely of long lakes, to Dalen. From Dalen the route is continued through the interesting Telemarken District to Haukeli, a place celebrated for its reindeer. Although these are mostly away at pasture, the traveller can generally rely on reindeer venison forming one of the courses at dinner. From Haukeli the route runs down to Odde, then over some of the ground covered by Tour No. 3,



GLEN LYON AND KENMORE.
(From Messrs. Ward, Lock, and Co.'s Guide Books.)

including Vossevangen, Stalheim, the Nærödal, Gudvangen, and after cruising about in the Sogne Fjord, the steamer threads its way among the wonderful collection of rocks and islets, passing now into nooks from which there seems no exit, and now through channels in which there is apparently no room to turn, and finally reaching Stavanger, from which the journey home to Hull is made.

Space forbids us to say more about these tours. We think, however, that one of the above, or Tour No. 4, "The Valders Route," will best suit our readers; but any one thinking of trying one of these or Tour 5, "Western Norway," or the more ambitious and expensive tour to the capitals of Denmark, Sweden, and Norway, should write at once for particulars to Messrs. Cook and Son.

But the conducted tour is not the only way to see the country; independent tours may be taken, and the little book issued by Thomas Cook and Son, entitled "Independent Tours in Scandinavia," gives full particulars of routes and prices of tickets. Complete sets of tickets are put together which save all the trouble of repeated bookings.

We have dwelt at length on the Norwegian tours, because those are the ones in which we feel the keenest personal interest, but we can also recommend the excellent arrangement of Cook's tours to Switzerland. These are arranged on two systems—either a round journey continually passing on from place to place, or a stay in one place as centre with daily excursions from it.

Excellent tours are also arranged for the Rhine, the Ardennes, Holland, Belgium, North Germany, Normandy, &c.

No doubt many of our readers will pay a visit to the Liège Exhibition. This does not compete in size with such monsters as the Paris Exhibition or the St. Louis Exhibition, but the visitor will find as much as he can see in the time at his disposal, and will certainly find the Exhibition full of interest. Indeed, were it not so, it would be worth while to run over to Liège, even to make the Exhibition an excuse for a cheap tour in Belgium. The Belgian State Railway will issue cheap seven-day return tickets to Liège during the time the Exhibition remains open. The return fares from London are only £2, 5s. 6d. first class; £1, 13s. second class; and £1, 2s. 6d. third class. The journey may be broken at Ostend, Bruges, Ghent, Brussels, or Malines and Louvain, thus affording a marvellous opportunity for visiting these interesting Belgian cities, each of which possesses attractions of its own, for a price less than the ordinary single fare to Liège. The Exhibition is organised by the authorities of the town and province to celebrate the seventy-fifth anniversary of the independence of Belgium, and the enterprising industrial town seems determined to show what it has done in the way of developing manufactures and what it can do in the way of entertaining and amusing visitors.

ODDE. [*From Messrs. Cook's "Travellers' Gazette."*

Visitors to Belgium are under a great debt of gratitude to the State Railway for the extraordinary facilities it offers for seeing the country. A pass or season ticket over the whole system, available for five days, can be obtained for the ridiculously low figure of 9s. 3d. third class, 16s. second, and 24s. first, and fortnightly season tickets can be obtained at proportionately low rates. Some of the other Continental railways have followed suit, and it is an example that might well be followed by our English lines.

Our numerous readers who intend to go to Switzerland will find the Belgian State Railway the cheapest and most comfortable way of getting there, and combined tickets for any Swiss tour can be had at the office in London (53 Gracechurch Street).

Some of our readers are ever anxious, like the busy bee, to improve each shining hour, and for such "holiday courses" are always in waiting. Teachers,

however, are not attracted to holiday courses unless there is some special feature in them. A few will follow a course in the advanced parts of an ordinary school subject such as Geography. To them we cannot too strongly recommend the holiday course of the School of Geography of the University of Oxford. University Extension Students will gladly avail themselves of the opportunities offered for collective work. One of the most popular forms of holiday course is the "Modern Language Holiday Course." The courses at Tours, Honfleur, Neuwied, and Santander are organised by the Teachers' Guild, which also publishes a useful list of addresses of lodgings and hotels at home and abroad recommended by teachers.

From our own experience we can strongly advise tourists of all kinds, especially cyclists, to provide themselves with such handy maps as "Houlston's District Maps," and such guides as the "Contour Road Books." They are invaluable.

In spite of the fact that Manual Training tends to get more and more into the hands of specialists, as distinguished from ordinary class teachers, the Summer Courses arranged by the Educational Handwork Association continue to draw large numbers of teachers as students. This year, as for some years past, a course will be held at Ambleside, thus enabling the teacher to combine a study of some branch of manual training with a visit to our lovely English lakes. A special course of Nature study is being organised this year, and what could be more enchanting than to study Nature amid such romantic surroundings. We do not know that the flora of the Lake District is richer than that of many other parts of England, though we have recollections of the enormous spikes of stately foxgloves we found there when we last visited the region. But Nature study is identical with the search for natural curiosities; but it seeks to instil into school children an appreciation of the beauties of Nature's ordinary works, and the teacher who has studied Nature in the spot which has inspired Wordsworth, will surely be imbued with the true spirit in which the subject should be taught.

SOME CITIES ON THE WAY TO AND FROM THE LIÈGE EXHIBITION.

STATISTICS are often misleading, and, like many an arithmetical statement, should be read with care. The men who work with such charming regularity for so many hours a day in the "rule-of-three" problems, have a habit, in actual life, of breaking-off for periods of lengthened contemplation.

When statistics record that there are more people to the square mile in Belgium than there are in England, the tired holiday-maker from the town hurriedly decides to give the little kingdom a wide berth. His imagination boggles at the picture of a crowd through which he must force his way to find elbow-room. But the distribution of population is like the distribution of wealth—somewhat unequal. The bewildered author looks vainly around for the pounds sterling which statistics inform him are his due on the principle of the division of the wealth at "so much per head"; and a short acquaintance with Belgium leaves one looking, vainly for the most part, to find a crowd.

As a matter of fact, once having left behind Antwerp, Brussels, and Liège, one may find many a sleepy hollow in towns that loom large in history. For the centres of polar attraction have changed. Proud cities like Bruges, Louvain, Malines, and Tirlemont have become inactive, the energy having shifted and now concentrated in the three cities that stand at the corners of the life that "triangulates" Belgium. And (as the provincial said of his dull town) these crowded cities may not be attractive to the jaded Londoner, but the facilities for getting away from them are without parallel. Though, for the matter of that, there is much to interest even the man who has an aversion to the noise and fury of cities whose wealth and trade have increased rapidly and not by those slow accretions which but add dignity to one already historic. Moreover, if you are, like Charles Lamb, "a lover of crowds," you may indulge your fancy to your heart's content along the quays of Antwerp, in the "old" heart of Brussels about the Grande Place, or, still better, from the Place St. Lambert to the Pont des Arches in Liège.

But if you are more inclined to rest and quiet (but yet not a bovine quiet), there are medieval towns, such as Bruges and Louvain, where you may find ample food for observation and contemplation.

For a short holiday indeed Belgium is hard to beat—always conceding that one has a liking for Man and his work. Many find in natural scenery a happy companionship and invigorating rest; to others, an acquaintance with new modes of life, ways of thought, and evidences of a past life, bring more joy and real relaxation. Like Charles Lamb at Enfield, while they breathe the sweet air they would still be sighing for the cobbles and stones of London. And there, in Belgium, you have an interesting people with historic towns, rich architecture, glorious beauties of fine art.

The first thing to do is to decide your route. You may start either from Antwerp or Ostend on your way to Liège, but the very cheap railway fares may be still further reduced on the well-managed Belgian State Railway by taking advantage of their *Rundreise* tickets. You have merely to indicate, a few days beforehand, by which route you wish to travel, and you obtain, at a reduced rate, a bundle of coupons from one town to another. A pleasant week or fortnight could be spent by visiting the towns in this order: Antwerp, Malines, Louvain, Tirlemont, Liège, Brussels, Ghent, Bruges, Antwerp.

I do not propose to give such information about these cities as may be gathered industriously from Baedeker, but merely to revive a few memories of happy days spent in not altogether aimlessly wandering from one town to another, yet with a freedom that followed any likely or interesting path.

Antwerp's fine cathedral, whose lofty spire you see long before the boat reaches the city, will of course come in your programme. You will admire its grace and beauty; while, within, its ornate sculpture in wood and marble, its height, its whispering sounds, and, above all, its magnificent paintings by Rubens, will give you delight. Then, if you love architecture, you will visit the Hôtel de Ville, and the churches of St. Jacques and St. Paul. Neither will you forget the Musée Plantin, that delightful old printing-shop and residence of the great printer of the sixteenth century, whose works became widely known for their accuracy and beauty. If it suits with your temperament, you will pass from room to room among the books and presses, and out into the old stately courtyard, with

the keen pleasure of a book-lover in a spot where books were cherished for their own sakes.

Malines comes up in my memory. It was a blazing day. I had seen its great cathedral from the train, a heavy, lofty pile dominating the city. Passing from

In the Flower and Fruit Market.

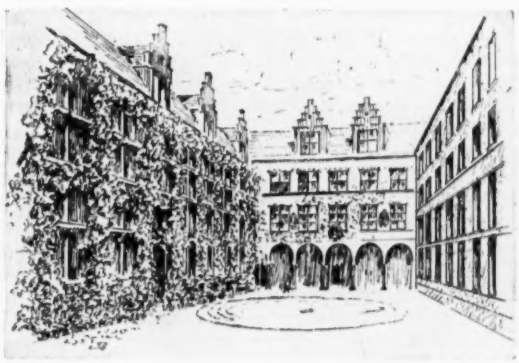
the busy station into the little, dreamy city, and up an old road that leads straight to the cathedral, I soon came to a bridge over the river, the Dyle, that runs through the city. As in so many old Belgian towns, it is along the rivers that you see quaint houses with their "stepped" roofs. Here they appear to have been forgotten and left to dream by the sleepy stream, while the city has changed with the changing times. I saw on the right an old church reflected on the water, and on the left a fine garden from which came the sounds of children playing. It was the Jardin Botanique, most beautifully kept, with fine shady trees invitingly cool on such a day. Soon I slipped into conversation with the old guardian. Perhaps that hardly expresses it, since he spoke in Flemish and broken German, and I endeavoured to fill in each hiatus with English and French. However, his energy was refreshing, and we spent a pleasant hour in gesticulation. Passing out again into the quiet, main road, I came to a fine open space, the Grande Place, in the centre of which stands the town-hall, and behind, rising to a height of 320 feet, the vast tower of St. Rombold's Cathedral. I looked round the square. Here were shops and private houses, once evidently inhabited by important people, but now poor and fallen far from their high estate. On one side is the delightful old Cloth Hall, now become a guard-house. One pictures this great deserted square filled with wealthy citizens in the sixteenth century, not the least dignified among whom were the Guild of the Cloth-workers, at a time when Louvain, Ghent, Bruges, and Malines were the weavers of stuffs for Europe.

There is, somehow, always that picture present to me in these old decayed towns; and when the beautiful bells chime, dropping their notes from such a height, I seem to be living in another age when a stirring life throbbed through the proud city. And there are broad streets, fine houses dating from the sixteenth century, open spaces that well accord with the stories of wealth and bustle. The Belgians have a happy knack, too, of utilising their old ramparts. As most large Continental cities (Paris and Brussels, for example) extended beyond the ramparts, the walls were pulled down and roads (boulevards) made in their stead. Malines and Louvain have not grown. On the contrary, you come across empty places, and even, in Louvain and Bruges, fields, where once the houses stood. But the ramparts have been made into fine, broad promenades with rows of trees.

The service in Malines Cathedral on Sunday is a sight to be remembered. In the vast church almost all the citizens, rich and poor alike, seem to congregate. The saints look down from the painted windows, the sacred paintings that line the walls seem to be more living in such a company than when we see them critically in an empty church, the carved marble figures stand like sentinels along the walls looking down upon a crowd that covers all the floor. Here on my right are bargees from the canal; there sits a crowd of poor women, hatless but neat, and with their children about their knees. The Mass ended, the crowd streams into the square, meets its friends, and breaks off into rivulets. From round the corner of the town-hall one hears singing. Three itinerant musicians, with bundles of songs in their hands, are singing some of Béranger's *chansons;* and the crowd joins in with gusto. An hour later, the square is deserted and falls back into its dreams.

But what am I doing? *Peccavi.* I am but following my bent; manners and customs entice me continually from the primrose path that leads to all the advertised sights of a city, and is spread with historical notes to charm the weary footsteps. I could tell you of delightful walks in the old city, or on the ramparts, or out into the trim country where the whitewashed cottages with their green doors are capped by red roofs picked out with white. But perhaps we had better move on to Louvain.

Louvain, city of priests, scholars, and soldiers!



La Musée Plantin.

Louvain, once proud of its cloth trade and its riches, now dwindled and shrunken even from its own walls! Here is a city indeed. Baedeker calls it a "dull" place. Perhaps so, but it has a town-hall worth a

pilgrimage to see. It has streets where you may easily think yourself slipt back into the sixteenth century. Walk on the ancient ramparts with their four rows of trees. Turn to the left as you leave the station and follow this boulevard, from which you can look down on the city. I remember such a walk one summer evening, under the trees, and looking over the city across fields where once houses stood. After a long walk, I came opposite one of the main streets, the Rue de Namur. Turning up this, what a change! Narrow courts had debouched their over-wearied, over-heated inhabitants, who were seated on chairs in friendly discourse; the shops, clean but poorly lit, formed spots of light along the dark streets; while on both sides rose, here and there, high buildings, colleges, churches, barracks. You at once recall the ancient university, the most famous in Europe in the fifteenth century, and you live again in the past. And when the Rue de Namur suddenly ended in front of the famous town-hall, one remembered the turbulent life when the citizens assembled here in defence of their rights. It is a beautiful Hôtel de Ville. It is for all the world like those chased old reliquaries that you will see in the Belgian churches; its front is lace in stone.

Dickens remarked that if a man wished to live in a place where he could have no possible desire to look out of window, he should go to Lant Street. The tourist, who is chiefly anxious to "do" a number of cities, will probably think Dickens might have found a duller place in Tirlemont, the next city on our route. For here once more is another city left stranded as the waves of prosperity have flowed in other channels. But I found it delightful. Again, like Louvain, it has its broad ramparts, set with trees, its old houses, and two fine churches, both of which have a quaintness that is hardly to be seen elsewhere.

When you walk down the quiet street from the station and suddenly find yourself in a great square surrounded by houses, the town-hall, private houses, and a very few cafés, you wonder at the extravagance that could demand such an open space, especially since, the town having shrunken, there are fields and orchards inside the old walls. How different it must all have been in the "Cloth" age of Flanders, when Tirlemont was not among the least important towns. But now, on this Sunday, I walk away from seeing its fine church of Nôtre Dame in the square, and look across a desert of road. Down the hillside I see empty streets twisting and turning, making a delightful sky-line. There is no animation till I come to a side street where a travelling roundabout is fixed. It is not elaborate. The horses have a permanent smile, and a peculiar anatomy; a tall boy sitting on one almost hides it from view. A moderate-sized room would provide ample space for its gyrations. But it excites the populace prodigiously.

Tirlemont has a bell, the most horrific in Europe. I slept over one of the cafés in the great square, facing the church, which looked sad and deserted at night. But it had a voice. At five next morning a terrible bell shook the house. On inquiries at breakfast whether there had been a fire, the proprietor said it was merely early Mass. But it was instructive in emphasising how those old turbulent Walloons were called to arms by their iron-throated bells; and the experience of this was worth the fright.

And now to Liège; a change indeed! I do not propose to describe this restless, hard-working, crowded city. It will delight chiefly for its position, for the country about is delightfully hilly. My chief remembrance of the city is not so much of its busy crowded streets, as of how I got away from it. For you must know, there are certain little trading boats, very primitive, very fussy, that call at tiny piers along the banks of the Meuse.

On the little pier are seated a few market women with loads; a stout lady with her friend, and a baby, worshipped by its mother, grandmother, and two maiden aunts, make up the passengers. Soon the tiny boat steams up with much fuss and clatter, we and our goods are transferred rapidly, the first-class passengers proceeding to the fore part, the second-class occupying the after deck in company with the luggage. Space forbids more than an indication of how we sped up the river, until on the one side we had a rolling hill-side, on the other, trim open country with mathematically planted trees; how occasionally we passed coal-mines, and saw the sturdy women carrying to a barge basket-loads of coal from the pit mouth. We approached locks, passengers went ashore, loads were put on board, the whistle screamed (and the startled baby joined it in chorus, to the consternation of his devotees), and at last, after a delightful three hours, we were landed at Maestricht, in Holland. The journey back was by train. It was pleasing to see all the market produce and all the baskets carried by the passengers to the custom-house at Visé. Heavens, what protestations! what objurgations! The Belgian peasants have a habit, at all times, of addressing each other in the railway train as though they were calling out their remarks across a field. At Visé, conversation is *fortissimo* as we leave the frontier.

Liège is admirably placed in beautiful country. The excursions are cheap and numerous, but few are more delightful than these primitive journeys by boat.

Time is short, so with a glance at Namur, and an excursion to Dinant, we turn to Brussels—the miniature Paris, as an excitable writer has described it, much to the amusement of the Parisian. There are handsome streets, fine buildings, especially in the newer districts beyond the Boulevards and the Rue Royale, though I always found more delight in the "old" but now unfashionable quarters about the Grande Place, and St. Gudule's Church. Here are the old-world, narrow, tortuous streets, the quaint houses, the finest medieval churches, and the town-hall, with the guild-houses around. The new city with its broad roads, its tree-lined boulevards, is handsome, but it lacks that touch of romance which is the gift of time.

Our last place of call is Bruges, though, if time permit, a pleasant day or two can be passed in Ghent, anciently most proud, rich, and truculent of all the Flemish cities. Its pleasant, busy streets, with the winding Lys wandering through the city; the dainty canals fringed with trees and appealing to an artist's eye as much for themselves as the trim barges decked out in white, blue, and light green, are only among a few of the sights. But Bruges cannot be slighted even for Ghent. This ancient seaport, now shorn of all its glory in trade, still lies the most beautiful city in Belgium. Some call it with reason the "Venice of the North"; for its canals, running in all directions as well as completely round the town, open out prospects of silent waterways on every hand. Bruges (the city, literally, "of bridges") is well named. The

most delightful little views are to be seen from these bridges; ancient houses with their gardens mingle their reflections with those of fine churches and ancient gates. In the town what remains are there of the once noble city! Broad squares, the Belfry (Longfellow's Belfry); the splendid cathedral rich with works of art; the old-world Hospital of St. John, of which I remember chiefly a grass lawn, where sweet clean linen lay spread, drying in the sun (such curious burrs cling to the memory); but over and above all, the deserted streets where the Middle Ages live again in fancy, for no town in Belgium has retained its old appearance so unchanged. There is that quaintest of churches, L'Eglise de Jérusalem; and on Fridays you may see the whole town trooping to make obeisance to the sacred relic in that curiously oriental-looking church, La Chapelle du Saint Sang. There are market-places with their white-capped, neat old women who seem to have stepped straight from the canvas of the great Flemish painters; there are deserted streets, almost weird in their silence; there is over all that charm which only a stately age can impart.

While I write these rambling lines I see again these beautiful old cities, but none more enticing than Bruges. If you have made up your mind to visit Liège and its Exhibition, you might do worse than include Malines, Louvain, Tirlemont, Ghent, and Bruges in your little tour. If you object, that this does not leave much time for Liège, I would point out to you the excellence of the service that will carry you easily from one town to another.

Finally, get a *Guide Officiel* (time-table) of the Belgian railways at any station. If you decide upon a tour, write beforehand to the office of the Belgian State Railway, 53 Gracechurch Street, London, E.C., where you can obtain your tickets beforehand and any information you require. As to language, English is understood at most hotels, and a very little French will see you through difficulties in out-of-the-way places. In the smaller cities, hotels are not elaborate, but are comfortable and cheap. They generally have a café attached to them, where you can get breakfast, &c., and you will have no difficulty in finding a restaurant for dinner. Don't trouble to search about for lodgings. It is generally quite as cheap, and certainly more comfortable, to put up at modest-looking hotels near the station. In Malines, Louvain, Bruges, Tirlemont, and Ghent none of the hotels are expensive. At Antwerp, Brussels, and Liège, it is advisable to go farther afield towards the centre of the town. If you travel *en garçon* your expenses, all told, should not come to much more than six or seven shillings a day.

A SUMMER MEETING IN HOLLAND.

A SUMMER Meeting will be held in Amsterdam in August next; it is to be open to the Dutch, and to British and Danish visitors to that city, and is not intended for members of the teaching profession solely.

The proposed programme is as follows:—

Morning lectures will be given by Dr. Hoogvliet, Reader in Languages at the Utrecht University; by Dr. Johanna de Jongh, Doctor of Philosophy, Reader in Utrecht University; and others, on Dutch subjects of an artistic, literary, and scientific nature.

The lectures will all be delivered in English.

Afternoons will be occupied with visits to places of interest, in many cases to places which are inaccessible to strangers.

Social gatherings in the evenings will afford visitors opportunities of intercourse with cultured Dutch people, and a better insight into the national character than ordinary travellers obtain.

Arrangements for this country are in the hands of Miss Scriven, Northwold Road School, Clapton, N.E., from whom particulars may be obtained.

If you do not wish to make a serious study of a foreign language, but to learn enough to tour in the country, you will find Marlborough's Self-taught Series very useful.

A SEE-HOLIDAY.

A SEE-HOLIDAY with a minimum of the sea, and yet a holiday among the sees, dealing with cathedrals, abbeys, and churches. Chateaux and champagne also figure in the bill. To parody and refine a common political jibe, it is a holiday not of beer and bible, but of champagne and cathedral—a spiritual holiday in which both soul and flesh may be brightened if not exalted; an apparently paradoxical holiday, attracting some because the risk of sea-sickness is but little probable, repelling others because the risk of see-sickness is very possible. To some there may be too much cathedral in such a holiday, although, for financial among other reasons, there is little risk of there being too much champagne. Natural beauty is not absent in N. France, although its beauty would hardly constitute what a tourist calls scenery. There is nothing of the type of the Alps or the Pyrenees; but to the historian, sacred or profane, to the antiquarian, to the æsthetic with a love for architecture, to the ordinary tourist even, seeking fresh holiday centres and thinking of refined rather than robust joys, this little tour will be not only satisfying but even gratifying.

We proceed to Amiens, an old city and a manufacturing town situated on the Somme and its tributaries, the Arve and the Selle, streams which form numerous canals in the lower part of the town. The central part of the town is engirdled by handsome boulevards which have been planted on the site of the old fortifications.

Most tourists probably go to Hôtel du Rhin, or Hôtel l'Univers, both of which are first-class, but we tried the second-class Hôtel de Paris and found it quite satisfactory.

There are other things worth seeing at Amiens, notably the Hôtel de Ville, at which the Peace of Amiens was signed, the large Museum, built in the Renaissance style, and the Public Library with its 70,000 volumes; but most tourists go to Amiens for its cathedral. Ruskin says this church well deserves to be called "the Parthenon of Gothic architecture," and affirms that "its style is Gothic, pure, authoritative, and unaccusable." And yet the building looks heavy, an effect probably due to the existence of a tall and very slender spire over the transept. On the west façade the two towers are incomplete, the one belonging to the thirteenth and the other to the fifteenth centuries. Like the spire, they are too small for the building, and so contribute to the general effect of heaviness. This façade has three lofty recessed porches, each being ornamented with reliefs and

statues. The doors are crowned with fine gables, a figure of St. Michael standing on the central one.

(*Photo by Walter Dexter.*)

AMIENS CATHEDRAL.

Rising still higher is a handsome gallery, and a row of niches containing twenty-two gigantic statues of the kings of Judah. Surmounting these is a fine rose window 38 feet in diameter, and another gallery over this connecting the towers. The whole constitutes a masterpiece.

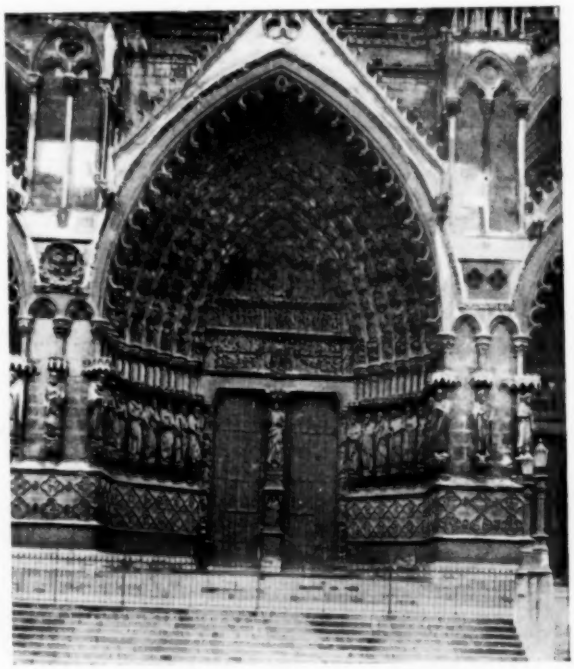
The inside is equally interesting, the nave and the choir being especially notable. The nave is 144 feet wide and 141 feet high, while the choir has 110 stalls, richly carved. The carving contains 3650 figures. The exterior of the choir screen is ornamented with coloured and gilded high reliefs, representing on the north side the history of John the Baptist, and on the south side the lives of two saints.

We train to Beauvais, the capital of the Department of Oise, a manufacturing town with spacious boulevards and the seat of a bishopric. It is a quaint place and most interesting. Its odd, narrow houses, with their pointed gables, are characteristic of the north of France. The quiet, almost grass-grown streets lying around the cathedral, with their fourteenth and fifteenth century houses, fitted with strange wooden ornaments and latticed windows, carry us back to the Middle Ages. A cathedral city seems to germinate human dormice, but we saw the place on a market day, and saw it galvanised into its periodic weekly outburst of life. One wonders if, like some of our own places, there is one day's bubbling and six days' simmering each week.

But Beauvais is a very interesting town to the tourist. First and foremost there is its cathedral. Begun in the thirteenth century, it is still unfinished in the twentieth, and probably never will be finished. At present it is only a piece of a cathedral, consisting merely of a choir with transepts of huge proportions. There is no nave and no spire. Should it ever be finished, it would be the largest and finest cathedral in the world, dwarfing St. Peter's at Rome into insignificance. The Gothic art of the twelfth century would have reached a degree of grandeur never surpassed, if this splendid specimen of architecture had attained its full development.

And yet there is much to interest and impress the visitor in this incomplete edifice. The choir, rising to a height of 104 feet, with its windows from 50 to 55 feet high, is truly wonderful. "There are few rocks, even among the Alps," says Ruskin, "that have a clear vertical fall as high as the choir of Beauvais." In fact the beauty of the choir has given rise to the saying that the choir of Beauvais, the nave of Amiens, the portal of Rheims, and the towers of Chartres would make together the finest church in the world. The south portal, dating from 1548, is also very fine, excelling as it does the whole façades of many other cathedrals both in size and magnificence. Unfortunately it has been stripped of its statues; the rich carvings alone remain.

In the left choir chapel, but built in from the public, is a huge astronomical clock, 39 feet high, 19 feet broad, and 9 feet deep. It is composed of 90,000 pieces, has fifty-two dials, and gives eighty distinct indications. The working of the clock is interesting, and in one or two cases funny, especially where the flames of hell



DOORWAY IN WEST FRONT, AMIENS CATHEDRAL.

(*Photo by Walter Dexter.*)

arise and the devil walks off with a newly-captured sinner, the pair disappearing into the fire. To see this

wonderful clock costs one franc, excepting on Saturdays and Sundays, when it works for half price.

BEAUVAIS CATHEDRAL FROM MARKET PLACE.
(Photo by Walter Dexter.)

Space is pressing, but Beauvais cannot be quitted without a reference to its tapestry. The industry was established in 1664, two years after the Gobelin tapestry at Paris, of which Beauvais is the only branch. The tapestries, as distinct from the Gobelin, are confined to small subjects, such as flowers, fruits, animals, landscapes, ornamental designs, and pastoral scenes. No historical or mythological subjects are treated, these being left to the Gobelin branch. There is no originality about the designs, the work being copied from paintings, so that the worker is not allowed any scope for his own imagination. The great feature of the Beauvais tapestry is the beauty and brightness of the colours and the delicacy of the shading, each distinct hue being represented by twenty-four different shades. Silk and wool are used, the colours of the latter being the more durable.

There is room only to mention the statue of Jeanne Hachette, the local Maid of Saragossa, with her interesting history; the Church of St. Etienne, with its mixture of all kinds of styles, executed at all periods of time; and the Palais de Justice, formerly the residence of a bishop. The Hôtel Continental is clean, comfortable, and possesses an obliging host.

From Beauvais we trained to Compiègne, a quiet, old-fashioned, picturesque town on the river Oise. It was always a favourite country residence of the French monarchs, and is a place of some historical importance. Joan of Arc was captured here in 1430, the spot being marked by a stone let into the wall of a house on the river bank, near to the Hôtel de Flandre, which is the hotel recommended.

Its chief attraction is its palace, which was rebuilt by Louis XV., and which was splendidly fitted up by Napoleon I., who often occupied it. The façade, which faces the forest, is 624 ft. long. It stands in a fine park which is open to the public. Backing the park, and stretching far away into the distance, is the forest, covering over 36,000 acres, being fifty-nine miles in circumference and containing many beautiful walks and drives. A speciality of the park is an arbour walk nearly a mile long, leading towards the forest. The arbour is made of stout wire and the vine is trained to grow over it. We saw it bare at Easter, but presumably it is a grateful place on a hot day and an attenuated shower-bath on a wet one. There are several churches worth seeing, and a visit should be paid to the small Hôtel de Ville.

A good excursion from Compiègne is a carriage drive to Pierrefonds through the forest. The carriage or brake comes to the hotel door and the charge is two francs. The place is 10½ miles distant, but the drive is made longer and is a cheap excursion, the beauty of the route making it a unique experience. The village itself is prettily situated on a small lake and it possesses a mineral spring, but its chief interest lies in its magnificent feudal castle. It stands on a rocky height above the village, and looks clean and imposing. It has eight massive loopholed towers, 112 ft. high, with walls 15 to 20 ft. thick. The donjon, richly decorated, is some index of the splendour which surrounded a mediæval feudal lord. It was restored in 1879.

We move on to Soissons on the Aisne, one of the oldest towns in France, formerly fortified, and rich in history from the time of the Romans onward. It is the meeting-point of several military roads, and is considered the key of Paris for an army invading France from the Netherlands. It is said to live and thrive

RHEIMS CATHEDRAL FROM MARKET PLACE.
(Photo by Walter Dexter.)

on the growth of haricot beans, but at the Lion Rouge, the best hotel in the place, they did not give us beans. But the weather did, for it was bitterly cold.

The usual cathedral of the towns in See-land was present, dating back from the 12th century, but it is so hedged in with buildings that much of the exterior is hidden. More interesting, from a historic point of view, is the Abbey St. Jean-des-Vignes, the remains of a great castellated abbey dating back to 1076. The chief part remaining is the portal or west façade, in the style of the thirteenth century, flanked by handsome towers of later date (fifteenth to sixteenth centuries),

Some Carvings on West Front, Rheims Cathedral.
(*Photo by Walter Dexter.*)

rising with their spires to the height of 230 and 245 feet respectively. Thomas à Becket found refuge here for nine years when in exile.

We next trained on to Rheims, one of the most historically interesting cities of France, strongly fortified, picturesque, and well-built, with a prevalence of the old style of domestic architecture. It has been a bishop's see since the year 360 A.D., the seat of an archbishop since the eighth century, and the place for the coronation of the kings of France. Its chief glory is its cathedral, which seems to be in a chronic state of repair; its chief profit, its champagne trade, which seems to be in a chronic state of prosperity.

The cathedral of Nôtre Dame is "one of the noblest and most magnificent examples of the early Gothic style," and was built between 1212 and 1430. In the limited space at our disposal it is simply impossible to describe it with justice. It is, perhaps, the most beautiful structure produced in the Middle Ages. "Nothing can exceed the majesty of its deeply-recessed portals, the beauty of the rose-window that surmounts them, or the elegance of the gallery that completes the façade and serves as a basement to the light and graceful towers that crown the composition."—*Fergusson.*

Armed with a letter of introduction we presented ourselves at Pommery's champagne factory, which lies on the outskirts of the town. The place was ideal and looked like a development of a garden-city. Clean, dainty buildings, standing in a garden rather than a factory yard, the whole estate was attractive and commendable. Inside, the workshops were lofty, clean, airy, light, spacious and busy. Fortune smiled on us, for we were shown round by a high official and an Englishman. Mr. Dowling proved himself to be the prince of guides and subsequently the prince of hosts. There are ten miles of chalk cellars, lofty, well-ventilated, well lit by electric light, and each geographically named, the conjunction of names often being funny. Excavations are still going on, so that the mighty volume of wine annually produced may ever find proper and sufficient storage. At present there are 10,000,000 bottles laid down. Soon the millions will be thirteen. In the manipulation (*manutention*) of the wine, from the first to the last stage, from the vineyard to the packing-case, a bottle of wine passes through 150 hands. It was all wondrous, instructive, interesting. We found carriages awaiting us outside to convey us to the glass-blowing factory. Nothing but champagne bottles are blown. What the work must be in July and August it is painful to think, and thoughts of Gehenna and the burning lake began to arise. From the glass factory we were driven to the cork factory. The corks are made by machinery, and all the mechanics are women. The surprising element in this visit, over and above the female mechanics, was the number of machines a piece of bark had to visit before it issued finally as a full-blown cork. The whole champagne experience was a delightful one, and we wended our way to the Hôtel de l'Europe filled with the joy of a day most successfully spent, and with feelings of gratitude—which will linger long in memory—to our amiable and obliging guide and host, Mr. Dowling.

On our way back we rested one night at Chauny, slept at the Hôtel du Pot-d'Etain, and from there visited Coucy-le-Chateau (8½ miles) to see its famous castle, one of the most striking monuments of the feudal ages in the whole of Europe. The donjon, 210 feet high and 100 feet in diameter, the walls in some places being 34 feet thick, is the finest specimen in Europe of mediæval military architecture. Prior to Chauny, Laon was visited on purpose to see its cathedral, as it is still called, although Laon is no longer a See. It is beautifully situated on a long, isolated hill. We stayed at the Hôtel de la Gare.

Nothing has been said in this article about ways and means, outside a few hints on hotels. It is assumed that those who wish to make the trip will buy their Baedeker or other good guide-book, will inquire at Cook's Tourist Agency and so get all the information they require. If advice may be offered as to travelling, it is to suggest that a ticket should be taken to Calais or Boulogne, and that, having mapped out the route, a ticket should be taken from there. You can then travel by *any* train. We took a second return excursion ticket to Paris, and found ourselves, as a consequence, at times limited to travelling in Paris trains only. You can arrange your own route, and get a reduction on taking a quantity, but there are certain disadvantages even attaching to these *facultatif* tickets, as they are called.

THE GAMES COURSE AT NÄÄS.

A GAMES Course at Nääs had long been our desire, and, last summer, we found it possible to avail ourselves of the privilege of attending one. Having a few days to spare after landing at Gothenburg, we were advised to start for Stockholm without delay. To avoid a tiresome railway journey of ten or twelve hours we decided to travel by the longer, but much more interesting canal route. For three days we sailed along in a tiny floating palace, through scenery remarkable for its great beauty and variety. Those days will ever be memorable to us as amongst the most restful and enjoyable of our lives. We sat on deck from morning till night, loath to miss any of the pleasure to be derived from viewing the ever-changing landscape and water-scape spread out before us—happy in the enjoyment of perfect weather and the delightful sensation of gliding along through water, not only clear as crystal, but smooth as glass. During that time the steamer passed through seventy-four locks while in the Western and Eastern Götha Canals. As several of these were situated quite near one another, we were at liberty to leave our temporary home and indulge in an invigorating walk along the picturesque banks of the canal, where wild flowers and fruits were growing in great profusion. We had also the opportunity of visiting the wonderful Falls of Trollhättan, which, not only in grandeur of scenery, but in volume and force, far surpassed our expectations. We arrived at Stockholm early in the morning and were surprised and delighted by the beautiful panorama which met our eager gaze. The sun was shining brightly on the gaily painted houses, built on the wooded slopes of the many islands scattered over Lake Maelar. A description of this "Venice of the North" is quite impossible in the space at our disposal, but we hope no one will plan a tour in Sweden without paying it a visit. The tourist is amply rewarded for the time and money spent in reaching Stockholm by the unique experience of living in this city of many islands. Communication between them is maintained by means of several handsome bridges and also by innumerable little steamers which ply incessantly between the different piers with lightning-like rapidity. But, the object of our visit to Sweden being the Games Course at Nääs, we had reluctantly to tear ourselves away from the allurements of the capital and travel as quickly as the train could carry us, to be in time for the Inauguration Ceremony.

The estate of Nääs is situated on the Stockholm-Gothenburg Railway, about three-quarters of an hour from the latter city. When we alighted at the quiet little station of Floda, it was difficult to realise that we were on our way to attend a School of Handicrafts of world-wide reputation. We sailed across Lake Säfvelingen in a steam launch, and found the Director, Herr Salomon, on the pier, to extend to us the courteous and hearty welcome given to all, whatever their nationality may be. The students were lodged in different cottages on the estate, and we were charmed to find ourselves quartered in an ivy-covered chalet by the beautiful lake side.

On the following morning the opening ceremony took place, which, notwithstanding its simplicity, was of a most impressive character. The 180 students who had had the good fortune to be selected for the Jubilee Course assembled at the Castle. In passing we may explain that this was the residence of Herr Abrahamson, the generous philanthropist who bequeathed his estate to the Swedish Government, so that Sloyd might be properly taught, first, to the teachers, and, through them, to the children, not only of Sweden, but of the whole world.

The Director addressed the representatives of each country in their mother tongue—rather a strain on his linguistic powers, as these included, besides Swedish and English-speaking students—Norwegians, Danes, Dutch, Germans, and one Italian. Then the work of the Course began.

This included—(1) GAMES; (2) LECTURES; (3) MAKING BALLS used in the Games.

(1) The Games may be divided into two sections—(*a*) *Indoor Games* played in a gymnastic hall. They consisted mainly of old folk-lore songs set to quaint Swedish tunes and accompanied by suggestive motions or country dances. (*b*) *Outdoor Games*, both ring and ball, for children of all sizes and ages. In Sweden the teachers take a great interest in the children's games. They frequently go into the playground, supervise the game being played, or teach a new one—a custom much to be admired and emulated. Since our return we have spent many happy hours in the playground with our little ones, and hope to introduce variety into their somewhat monotonous style of play.

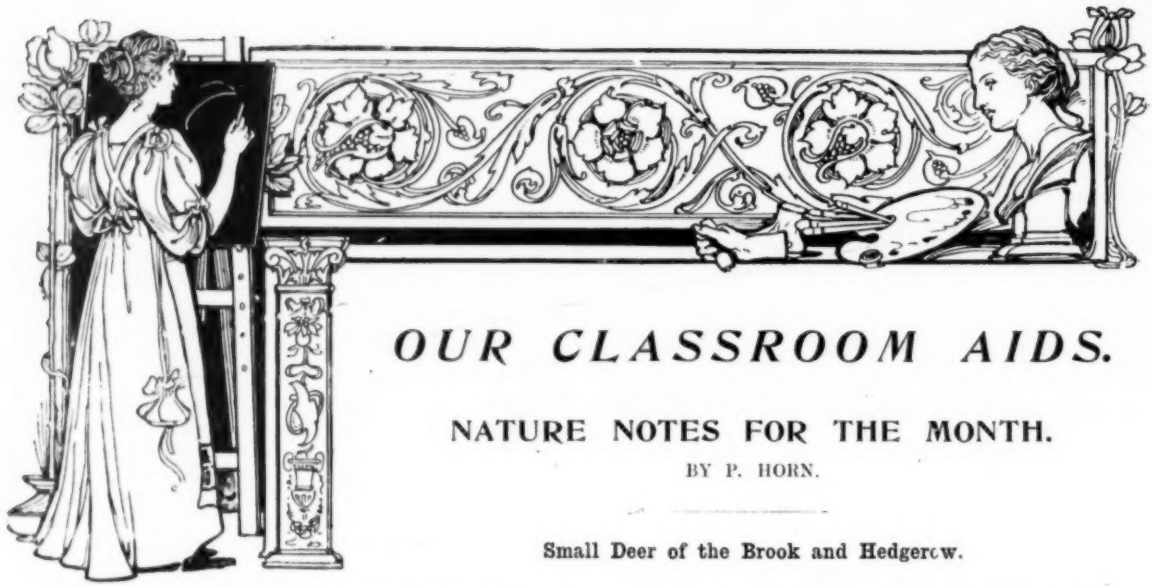
(2) Lectures (*a*) *On the History of Games* given by Herr Salomon, and much appreciated by the students, but from which we could derive no benefit, as Swedish was quite unintelligible to us. Our attendance was therefore not compulsory. Lectures (*b*) *On the Principles of the Nääs System of Sloyd* conducted by Herr Salomon on the Socratic Method, which proved to us a source both of pleasure and of mental stimulus.

(3) Making the different kinds of balls, woollen and leather, used by the children during their play.

The 40 students attending the Games Course were separated into two divisions, each taught by a Swedish teacher, who unfortunately on this occasion could speak no English, thus placing us at a great disadvantage. We were engaged during the day either in learning new games, perfecting ourselves in the rules of those already learnt, in making balls, or in attending lectures. Work began at 8 o'clock, and, with the exception of one hour for lunch, continued until 5 P.M. On alternate evenings each division took part in teaching any students from the Sloyd Course who were desirous of learning a few of the games, several of the Games students taking charge of the class in turn.

Before the end of the Course an extra game was taught by each student, necessarily one entirely new to the Director, and if original, so much the better. Our free evenings were devoted to boating on the lake, concerts arranged either by the Swedish or English-speaking students, lectures illustrated by limelight views, &c. Thus the four weeks passed all too quickly away, and we regretfully bade farewell to Nääs, feeling our life had been made richer and fuller by the unique and varied experiences through which we had passed, and by the friendships formed during the month we had spent there.

We returned to the routine of school life firmly resolved to emulate in our quiet sphere of work the noble example of our much respected Director, Herr Salomon. Few students leave Nääs without feeling that the influence of this good and great man has left an indelible impress on both mind and character.



OUR CLASSROOM AIDS.

NATURE NOTES FOR THE MONTH.

BY P. HORN.

Small Deer of the Brook and Hedgerow.

THE most neglected branch of natural history, and one which receives comparatively little attention from the average field naturalist, is the study of the smaller British mammals.

If it were possible to take a census of the small deer of the brook and hedgerow, in all probability it would be found that in point of numbers they compared favourably with the more conspicuous feathered tribe; indeed at seasons, certain species have become so numerous as to constitute a plague. Yet, though most field naturalists are familiar with the birds, and flowers and insects too, it is the exception rather than the rule to find an amateur who is conversant with the ways of the humble furred folk.

To some extent the nature of the existing literature is responsible.

On looking through the current books, it will be noticed that the budding entomologist and botanist are amply catered for, perhaps too much so, but when we come to consider the four-footed "vermin," prospects are not so encouraging.

As cabinet specimens, rats and voles evidently compare unfavourably with insects and plants.

Another reason why these common creatures are so persistently overlooked, lies in the disposition of the animals themselves. Some are nocturnal feeders, seldom venturing abroad until dusk; others which are diurnal in their habits, skulk in the herbage; and all without exception are unobtrusive and retiring, the result of years of persecution from enemies furred and feathered.

Modesty is an indispensable virtue when the keen-eyed kestrel is hovering overhead. Therefore we must not be disappointed if the brown vole scurries away at our approach.

Hedgerow animals may be divided into three or rather four divisions:—

The rodents, further subdivided into mice and voles.
The insectivores, such as shrews, hedgehogs, and moles.
The carnivores or flesh-eaters, the best known of which are the stoat and weasel.
The members of class four are self-evident, so we will not touch upon them.

Difficulty often arises in distinguishing between mice and voles, and in turn these two animals are confused with certain of the insectivorous creatures—the shrews—the common plan being to bracket all three together, and label them indiscriminately "mice." These so-called mice are the very creatures which we are liable to meet in the course of a ramble, so in order to have an intelligent appreciation of their habits, we must first of all be able to differentiate between the families.

Voles and Mice.

How to Distinguish.—Voles and mice have many characteristics in common — the chisel incisors for instance; but when once specimens of each have been seen together, no future difficulty will be experienced in recognising them. The water-vole and the house-rat are excellent types for comparison (the rat is in the same category as the mice). both being of similar size.

The first great exterior difference lies in the shape of the head.

The vole has a short blunt muzzle which somehow calls to mind the honest features of the beaver, particularly when the animal is sitting on its haunches nibbling a piece of water-weed, and the resemblance is further heightened by the short ears, close hidden for convenience sake in the thick fur.

The features of our cellar friend have a lean and hungry look, suggestive of his town origin, when compared with his bucolic country cousin, the vole.

The ears in this case stand out naked, prominent, and ever ready, as befits a predatory gentleman who lives by his wits.

The body of the vole is obviously stouter and more sturdily built than that of the house-rat.

Going to the other extremity, the tail, we immediately notice that the short hairy appendage of the vole is much different to the long, scaly, tapering organ which, so a schoolboy friend informed me, disfigures rats and mice. These are the chief external characteristics which appeal directly to the eye.

Take two dead specimens, open the mouths of each and look at the grinding teeth. The vole's molars, seen from above, owing to their structure, give the impression of a "row of longitudinal prisms set alternately." The crown of the rat's molar is "tuberculated." The appended diagrams, taken from the Museum, will give a good idea of the two patterns.

GRINDING TOOTH OF RAT AND VOLE COMPARED.

The Water Vole.—This engaging fellow, sometimes miscalled the water "rat," is essentially rural, and must not be confused with the brown rat, which often reverts to a semi-aquatic life. To see the water vole at home we must visit the streams and canals away from town.

Probably the first intimation of his presence will be a smart "plop," followed by a string of bubbles which mark the progress of the unseen diver towards his submerged doorway, for this vole always provides his burrow with an emergency exit beneath the surface.

After a short interval the unsuspecting animal invariably appears, and provides an excellent opportunity for observation.

A very different creature to the rat he looks, as he sits, complacent and rotund, cleaning his warm brown fur, on the well-trodden strip before the entrance hole. Vegetarians will be interested to know that the water vole also shares their views, a favourite article of diet being the succulent stems of the water-flag and sundry river grasses. On a quiet summer afternoon, the sound of his chisel teeth at work on the stems is a pleasant accompaniment to the voices of the reed bunting and moorhen. Though the harmless vole has been accused falsely of destroying eggs and young birds, there can be no doubt that in districts such as the Midlands, where the canals are above the level of the surrounding fields, his undermining propensities are a serious menace, but if people will persist in killing the stoat, the vole's chief enemy, the banks must suffer in consequence.

The young accompany their mother until well-grown. At present (May) there is an interesting family near the bridge at Horley.

The best time to observe this creature and also the water shrew is in the winter, when the vegetation has died down. In examining a dead specimen, do not forget to look at and feel the *interior* of the cheeks.

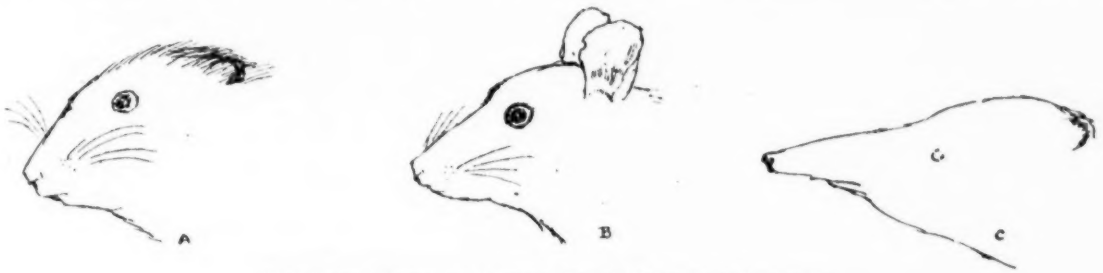
The Bank Vole.—There are two more species of voles native to Britain. The most likely to be seen by day is the bank vole, or "short-tailed field mouse" of early writers. To see this creature at home we must leave the stream temporarily, and go to the woods and thick hedgerows.

A favourite resort, as the name implies, is an overgrown bank where the bramble and ivy flourish. There are several such places within easy cycle ride of London; Wimbledon Common, Westerham Hill, and the Brighton Road near Crawley have lately been visited with success.

Here again the animal's native restlessness betrays it. If the little brown bank vole had the good sense to sit still, the naturalist would have a poor chance of distinguishing it amidst the surrounding carpet of dead leaves; but fortunately it is for ever moving, so that the observer with keen ears is tolerably certain to locate the cause of the intermittent scuffling.

To all outward appearance this vole is a prototype of the foregoing, slightly larger than an ordinary mouse. Providing quietude is observed, it has no objection to the presence of a stranger.

After a quick glance round to assure itself that no harm is meant, it scampers under the brambles for a short distance, stops, and hurriedly proceeds to rout amongst the fallen leaves. Presently we see the cause of this feverish energy; the vole has unearthed a treasure, perhaps an old beech nut or a seed from last autumn. Sitting upright, with the seed between its fore-paws, it vindicates its connection with the squirrel and other *rodents*. An incautious movement at this juncture is immediately observed by the owner of the beady eyes and twitching lips, and, with a bound, it is safely ensconced in the intricacies of its leafy tunnel.



THE THREE TYPES OF "SMALL DEER" COMMONLY CONFUSED.

(A) Vole. (B) Mouse. (C) Shrew.

The bank vole is a prolific breeder, as many as six or eight young being produced at a birth; in hard times the overflow population visit the ricks and gardens, where they make their presence known by their depredations. Were it not for the kestrel and other predatory creatures, the country would soon be overrun with these animals and their allies. Recently when examining the crop of a kestrel, the semi-digested remains of no less than three small voles (distinguishable by their tails) were discerned, and I have also found them in the stomach of the barn-owl.

The Long-tailed Field Mouse.—Country cats are useful at times, in spite of the havoc which they work amongst young birds. During the past year one sleek feline of my acquaintance has brought large numbers of small deer into the house. The chief victim is the wood mouse. Slightly larger than an ordinary variety,

this individual has brown fur, white on the under parts, and a proportionately longer tail.

As a rule the wood mouse is not so frequently met with as the voles, but its stores of provender in the shape of hedgerow seeds are often found in deserted birds' nests.

It has been stated that this creature is one of the farmer's worst enemies. Not only does it pillage the unthreshed ricks and cornfields in company with the voles, but it also provides against the proverbial rainy day by accumulating considerable quantities of grain in its underground burrow. Combined with a remarkable prolificacy, this interesting trait has a great deal to do with the animal's bad reputation in agricultural districts.

Two other mice are occasionally seen—the Harvest mouse, one of the tiniest of British quadrupeds, whose prehensile tail, long and tapering, enables it to climb to its grassy ball-shaped nest affixed to the swaying stems; and the Dormouse, which is usually considered to be the link between the mice and squirrels.

The Shrews.

How to Distinguish.—Three species of shrews are native to this country, two terrestrial and the other aquatic. One of the former, the Pigmy shrew, has the distinction of being the smallest British mammal.

As the Common and the Water shrew are apt to be met with, a few words concerning their personal appearance will be necessary.

Shrews are very similar to mice; most people would designate them "mice," but there are certain differences between the two. Imagine a little animal combining the characteristics of the mouse and the mole, and you will be able to recognise the shrew when it shuffles into view beneath the hedge.

The short velvety fur is dark brown or blackish and pale beneath; feet similar to those of the mouse, the head long and narrow, ending in a curious flexible snout. Eyes and ears the shrew apparently lacks, these tiny organs being hidden away in the fur. The short tail is worthy of comment. A section cut through would roughly be *square* instead of circular.

On opening the shrew's mouth we at once see the reason why it is not classed with the Rodents. The upper incisors are not chisels or gnawing implements, kept sharp by constant friction with the lower set, which, it may be remarked, are straight and project horizontally forward. Further confirmation of the animal's insectivorous propensities is provided by the structure of the grinders or cheek teeth, the crowns of which are raised regularly here and there into sharp minute points of the enamel. A similar form of tooth is found in the hedgehog and bat.

The Common Shrew.—When gathering plants from the hedgeside, the collector is often struck by a singularly shrill and penetrating cry, so high-pitched and soft as to be almost inaudible. Should the fates be propitious, the sound is followed by a violent upheaval of the dead leaves, and in their midst we get our first view of the shrew, a weird brown "mouse" with long fleshy nose, which it elevates and twitches in a most amusing fashion. The land shrew seldom remains in view for any appreciable length of time; its prodigious appetite allows but little leisure.

Sniffling and squeaking, our fussy friend dives once again beneath the rubbish in his quest for insects, his progress being plainly discernible in the rustling and shifting of the leaf carpet.

Shrews are extremely pugnacious. If by chance two meet, they invariably disagree, and provided the scuffling does not attract the attention of a passing bird of prey, the victor disposes of his rival's body in the approved animal fashion. A pair which I once caught and confined, actually resumed and finished their battle in the usual manner, after making a hearty and somewhat audible meal of two large worms. The surviving cannibal died next day, presumably from want of food.

Shrews have a most distinctive odour, which is very apparent to the taxidermist. On account of this peculiarity the household cat never ate them, but it is stated that the owl has no such objections.

The Water Shrew.—Where the streamlet runs clearly between rank beds of rushes and willow-herb, there the Water shrew or "ranny" of the Hertfordshire folk will certainly be found. In general appearance it resembles the smaller terrestrial form, but the fur is blacker and the under parts white. It is interesting to note that the tip of the tail is slightly flattened. May is the best time to see and procure specimens. The shrews then roam about in search of partners, and consequently are more liable to be seen. As an aquatic expert this creature stands pre-eminent amongst animals After a surfeit of caterpillars and worms, the Water shrew slips quietly beneath the surface and proceeds to forage on the bottom for the asellus and water-shrimp, aided probably by its conveniently long proboscis.

When under the water the animal's plump black body appears a silvery grey, owing to the presence of air bubbles entangled in the short fur.

Any specimens of "small deer" which may be deemed desirable to send to the taxidermist should be carefully disembowelled and dusted inside with alum previous to transit; in hot weather decomposition begins to set in very quickly, loosening the fur of the under parts.

Judging from the numerous queen wasps seen this spring, the striped gentry will prove troublesome when the pears are being gathered.

From similar indications there is every prospect of a good supply of tortoise-shell larvæ for the insect-rearer.

Next month—

"Birds of the Year and how to Distinguish them."

NOTES OF LESSONS ON THE GNAT.

Class.—These lessons are most suitable for the upper standards of rural schools, as the children have better opportunities of becoming acquainted with the more attractive forms of insect life.

Time.—Two lessons of half-an-hour each.

Object.—To interest the children in the insect life around them. For this purpose we have selected an insect which is often declared to be an intolerable nuisance, but this is only by those whose acquaintance with it is limited to the fact that its bite is painful and often has unpleasant consequences; closer acquaintance with the gnat, the various changes that it undergoes,

and the peculiar fitness of its form for each of these stages, shows that in spite of the unpleasantness of its bite, the gnat is a subject of great interest from the first moment of its existence to the last.

Step I. Preparation.—Briefly recapitulate what has already been learned of the points that distinguish the great classes into which the animal world has been divided, particularly the distinguishing features of insects. In the lessons on the spider we considered these characteristics of an insect:—

1. The trunk is divided into three segments—Head, Thorax, and Abdomen.
2. All insects have six legs and two antennæ.
3. Insects pass through several changes before they attain their perfect form.
4. Insects breath by means of a network of tubes running all over their bodies.

Step II. Presentation.—Let us commence by tracing the life-history of the gnat and following the transformations that it undergoes.

The Egg.—Towards the end of April or the beginning of May the female gnat lays her eggs, and in the preservation of these she shows marvellous skill. Although the gnat is a land insect, it seems to distrust this element for her eggs and young ones, so unlike her cousin the daddy-long-legs, who buries her eggs in the ground, the gnat has devised a means of entrusting her eggs to the water. At first sight this would appear to be a very difficult undertaking, for the egg, although exceedingly minute, is more dense than water, and so would sink just as a piece of iron does when placed in water. But although a piece of solid iron sinks, we are able to make iron ships which float as easily as wooden ones; this is reckoned a triumph of human skill, but the tiny gnat solved this problem long before man did, for when she lays her eggs she fastens them together into a tiny boat-shaped mass, which rides on the water with the buoyancy of a lifeboat. In the early days of summer, scores of these tiny boats may be seen floating about the surface of stagnant pools, for the gnat carefully avoids running water; here they float about, each egg being so arranged that its upper end is out of the water and exposed to the heat of the sun; the lower end of the egg is furnished with a trap-door through which the grub can escape into the water when it is fully developed.

The Larva.—The larvæ are strange little creatures with big round heads and forked tails; they are exceedingly active, darting hither and thither in search of their prey with great rapidity. Their food consists of minute organisms which abound in stagnant waters, and whatever may be said against the fully developed gnat, the larvæ are undoubtedly of great service to mankind by devouring these organic substances which would otherwise become a source of danger and disease.

If we watch these tiny creatures we find that they often come to the surface of the water, where they remain for some time head downwards. This is done to obtain air, for, unlike the larvæ of many insects which pass this stage in the water, the larva of the gnat is not provided with gills, but breathes through a small tube situated in the hinder part of the body. The larva grows very rapidly, but as its skin does not stretch it casts it when it finds it too tight; when it casts its skin for the fourth time it emerges as the pupa.

The Pupa.—This state is quite different from the previous one, for it is now enveloped in a transparent case, through which the pupa can be seen and the changes that it undergoes observed. The head and thorax have now become fused into one mass, the rest of the body tapering off very much as the tail of a tadpole does; the breathing apparatus too has changed completely, for instead of breathing through the last segment it now breathes through two tubes situated at the back of the head. The pupæ of most insects are perfectly quiescent, but that of the gnat still continues to swim about in the water by means of a fin-like appendage situated at the end of the pupa case. The reason of this activity is not quite clear; it certainly does not move in search of food, for the pupa takes no nourishment, the head and mouth being completely enveloped in the pupal case. All this while the limbs have been developing, and the time has now arrived for the perfect insect to escape from its case. As the pupa nears maturity, the case swells and becomes more buoyant, consequently more of it floats above the water. This part becomes very dry with the heat of the sun, and finally splits right along the two halves of the case, opening outwards like a pea-pod; this open case forms a tiny boat in which the fully developed insect balances itself for a few moments whilst it stretches its legs and shakes out its wings, then when it realises the powers of its wings it quits its temporary boat and commences a new life in a new element.

The Imago or Perfect Insect.—The full-grown insect belongs to a class of insects which is distinguished by the fact that the members possess only two wings instead of four, and are unable to fold these wings over the body when at rest. Although the gnat possesses only one pair of true wings, it has a second pair in an undeveloped state. These are in the form of two little knobs situated just behind the wings and known as halteres or balancers. This name carries us back to the time of the ancient Greek athlete who held a leaden weight in each hand to balance himself while leaping, and it is very fitly applied to these rudimentary wings, for in some way they seem to balance the insect and steady its flight.

In spite of its insignificant size, the gnat is able to inflict a painful wound. This is not done with a sting, but is the result of a bite. The mouth of the gnat is furnished with a formidable beak about half as long as its body and rather complicated in structure. With this beak it pierces the skin and pours into the puncture a small quantity of poison which irritates the wound, causing great pain, often followed by inflammation and swelling of the limb. Contrary to what one might expect, it is only the female which is able to inflict this terrible bite, the male being perfectly harmless. The male may further be distinguished from the female by its antennæ. These delicate organs possess no less than fourteen joints, and in the male every joint has a tuft of hair on each side, thus giving the antennæ a feathery appearance, whilst those of the female are perfectly plain and thread-like.

Step III. Association.—The various stages of development through which we have followed the gnat are typical of the changes which all insects undergo, but we must notice that the larvæ and pupæ of different insects often differ from one another in many important points. Thus the larva of the gnat is a quaint-looking creature with a round head and forked tail, but the more usual form of the larva is that of the maggot as is seen in the case of the fly and the beetle. The growth of all larvæ is very rapid, but the skin does not expand at

a corresponding rate, consequently it becomes very tight until at last it bursts and the larva emerges clothed in a new skin; this process is repeated several times until the second or pupal state is reached. Here again the gnat is rather exceptional, for although enveloped in a hard case it is able to move about whilst in this state, but as a rule the larva or chrysalis is perfectly still and apparently lifeless. It is during this stage that the development and growth of the insect is completed, for when the perfect insect emerges from its pupal case it is fully grown and never increases in size, so although there are flies of various sizes, this is no indication of their age, for a small fly will not increase in size as it gets older. Although these three forms of the same insect are so very different, there is one point of resemblance in all three; no matter what the insect may be, the larva, the pupa, and the perfect insect will each have the same number of rings to its body.

Step IV. Formulation.—The gnat passes through four stages:—

1. The egg; boat-shaped masses that float on the water.

2. The larva; round head, forked tail, very active; breathes through an opening in the last segment; devours organic matter that would otherwise decay.

3. The pupa; enclosed in case, but still swims about.

4. The gnat; one pair of wings and two *halteres* or balancers; the mouth of the female has a kind of beak which gives a poisoned wound; the antennæ of the male are hairy.

Step V. Application.—The gnat is often employed as a symbol of anything small and insignificant, and yet we have seen that not only is the gnat itself most delicate in structure, but it passes through changes each of which is fraught with interest. The appreciation of this will cause the children to regard these tiny creatures in a different light; they will no longer look upon them as

> "Ugly things, all legs and wings,
> With nasty big tails, armed with nasty great strings;"

but as things of life and beauty, each filling its allotted place in God's great scheme.

NOTES ON AN EXPERIMENTAL COURSE OF LESSONS ON AIR AND WATER.

BY EDWARD J. RUSSELL, D.SC. (LOND.),

Lecturer in Chemistry at the South-Eastern Agricultural College, Wye.

(*Continued from p.* 619.)

Cooling Produced by Evaporation.

As water evaporates it cools. Many instances of this action will occur to the teacher. Amongst others may be mentioned:—

1. The danger of wet clothes. Clothes will absorb a considerable weight of water, which in drying takes from the body a large amount of heat.

2. The cooling of tea or other hot liquids by means of one's breath. The vapour in contact with the liquid is removed by blowing, more vapour is produced to take its place, and the temperature of the liquid falls. If the vapour is removed rapidly enough, a considerable lowering of temperature is obtained.

3. Country children will know that wet soils are cold and "late," *i.e.* plants grown thereon neither grow as quickly nor ripen as early as on dry soils. The evaporation constantly taking place keeps the soil cold, and the plant has not the same chance to develop as on a warmer soil.

Experiment 82.—A cryophorus, costing about 2s., is required. This consists of two bulbs connected by means of a wide tube bent in the form of a letter J; it contains water but no air. Put the greater part of the water into the lower bulb and surround with a mixture of ice and salt. The water vapour is thus condensed, more evaporates from the upper bulb to take its place, and as a result of the cooling thus produced, the water therein contained freezes.

Incidentally a very curious experiment may be shown with the cryophorus. Shake vigorously, and the water falls on the sides with a sharp cracking sound, because its fall is no longer broken by a cushion of air between the water and the glass.

Experiment 83.—Volatile liquids show this effect much more readily. Stand a beaker on a block of wood moistened with a few drops of water, pour a little ether in and blow air vigorously through. The cold produced by the evaporation of the ether freezes the water, and the beaker now sticks to the block.

Experiment 84.—Moisten the outside of the air thermometer (Experiment 34, p. 399), observe the motion of the liquid as evaporation takes place.

The air thermometer was made by fixing through the cork of a flask a piece of glass tubing bent in the form of a U. A little coloured liquid is poured into the tube, and its position marked.

Experiment 85.—Usually takes a long time to prepare, but is very effective on special occasions.

Into a fairly large bottle fix (1) a tap funnel to contain water with a piece of cotton wick tied to the end inside the bottle; (2) a tap funnel to contain concentrated sulphuric acid and fastened to a glass rod wrapped with asbestos, so that as the acid runs into the bottle it exposes a considerable surface; (3) a tube bent at right angles. A glass dish is placed to receive the water dropping in.

Now see if your air pump is good enough for the experiment. Connect (3) with the pump, run in sulphuric acid from (2) till the bottom of the bottle and the asbestos on the rod are both well covered. This absorbs water vapour and considerably hastens evaporation. Next work the pump till the bottle is exhausted, and slowly run in water drop by drop; if the exhaustion is sufficiently high, the water evaporates very rapidly and freezes as fast as it enters, forming a long icicle. If the pump will produce this effect, matters are simplified, and the experiment can be prepared in a few minutes.

As a rule, however, pumps which work quite satisfactorily for the other experiments of these lessons are not good enough for this one. The difficulty can be obviated as follows:—Clean out the whole apparatus, dry thoroughly, put in fresh asbestos and cotton wick, and connect (3) with a distillation flask through the cork of which is a tap funnel (4). Fill with ammonia by passing a steady stream of the gas for some hours, letting the gas enter through (4) and pass out through (1). (The gas may be conveniently obtained by warming the concentrated solution in a

flask; it is passed through a tube of quicklime to remove water.) After a sufficient interval, when all the air has been removed, close the taps, disconnect the ammonia apparatus, and fill the funnels with their respective liquids. Run sulphuric acid into the distillation flask, let it stand for a few hours to absorb the ammonia. Then run acid from (2) into the large bottle to cover the bottom and the asbestos as before, and again leave for some time. The ammonia should now be completely absorbed, producing a good vacuum in the apparatus. Let water drop in from (1) and the icicle readily forms.

The experiment is much simpler than it looks. I have never known it fail provided the corks are tight and sufficient time allowed for the air to be displaced by the ammonia, and for the latter to be absorbed by the sulphuric acid.

Heat evolved on Condensation.

Natural processes are usually reversible. The heat absorbed when liquid water changes to vapour is given out again when the vapour condenses.

Experiment 86.—Boil water in a test tube; the steam condensing in the upper part raises the temperature so much that the tube can no longer be held.

Heat a dry tube for the same length of time; its sides remain comparatively cold.

The results are obtained so quickly that three or four of the children can do the experiment themselves.

It is now considered that the mildness of our western shores is due to the heat liberated when the vapour in the Atlantic breezes condenses, and not to the Gulf Stream, as was at one time thought. The higher temperature compared with that of the eastern districts is thus directly associated with the higher rainfall. For further particulars on this important subject see Gregory's Physiography, p. 201, a book every teacher should possess.

Boiling.

A liquid is said to boil when it is converted into vapour with formation of bubbles.

Experiment 87.—Find the boiling point of water, alcohol, brine, by heating in a flask and placing a thermometer in the liquid.

Dependence on Pressure.

The greater the pressure of the vapour on the surface of the liquid the higher will be the boiling point, and by artificially increasing or lowering the former, the latter is also changed. The pressure of vapour on the surface of the liquid depends mainly on the ease with which it can get away, and this in turn depends on the pressure of the air provided there is little or no draught. The connection between boiling point and *air* pressure is therefore only indirect; the controlling factor is *vapour* pressure. Bearing this in mind, the teacher will now see the necessity for working under comparable conditions in all experiments to illustrate this point.

Experiment 88.—Boil some water in a flask; let it cool somewhat, and connect with the air-pump through a condenser to prevent steam getting at the valves. (The cork must be good, and the tubes tightly fitting.) Work the pump; boiling begins vigorously again.

Some of the vapour having been pumped off, the liquid can boil at a lower temperature than was possible when a larger quantity of vapour was present.

The experiment may be made quantitative by a slight modification.

Experiment 89.—Use a litre flask and a well-fitting cork provided with two holes, through one of which passes a thermometer dipping right into the liquid, and through the other a tube joined as before to the condenser and air-pump. Connect through a T piece to a tube 32 inches high standing in mercury to record the pressure in the apparatus.

Work the pump and heat the flask, read the boiling points and the corresponding pressures. These may be plotted on a curve, but no equation has yet been obtained to fit the curve.

The following is very striking and simple:—

Experiment 90.—Boil water for ten minutes in a round-bottomed litre flask, cork and invert. The air having all been expelled, there is only an atmosphere of steam above the water; as this condenses the pressure is reduced and the water boils again. The condensation is most effectively produced by squeezing cold water from a large sponge over the flask. The greater the amount of cold water the more vigorous the boiling.

OUR ILLUSTRATED GEOGRAPHICAL NOTEBOOK.

CEYLON.

AUTHORITIES differ as to which was the real site of the Garden of Eden, but it is a very old belief that fixes upon Ceylon. The island can lay claim to a very ancient history; there is in existence a description of it that dates back ten centuries before the Christian era, and there are ruined buildings with ancient inscriptions that are the wonder and delight of antiquaries. The Greeks, Romans and Venetians visited the island, and Cingalese ambassadors came to the Emperor Claudius. Marco Polo visited Ceylon about the end of the thirteenth century and Sir John Mandeville in the middle of the fourteenth. In the year 1505 the Portuguese established regular communication with the island, and the King of Kandy paid them an annual tribute of cinnamon to protect him against the raids of Arabian pirates. The Portuguese were dispossessed by the Dutch, who in turn were driven out by the British in 1795. The island had long been divided into a number of petty kingdoms, which the King of Kandy brought under subjection. The monarch developed most tyrannical tendencies, and his subjects entreated the British to depose him; and Kandy thereupon definitely became a part of the British Empire. Two years later the natives rebelled, and again in 1848 the priests and chiefs exhibited discontent; but practically since a Council of Government was appointed in 1831 the people have lived in a state of contentment under British rule.

Ceylon is a Crown colony with two councils, one executive and one legislative, under a governor. The councils are largely consultative bodies subservient to the Governor, who can, with the consent of the Secretary of State, put into effect any law without the councils' consent. The island is divided into eight provinces, each of which possesses a government agent. The revenue of the island is derived from the customs duties, railway receipts, land rents, and salt monopoly. In 1903 the revenue was £1,961,550, and the

expenditure £1,780,980; there is a small debt upon the colony, the greater portion of which has been incurred in the construction of railways.

Physical Features.—Ceylon lies 50 to 60 miles south-east of the southern extremity of Hindostan, from which it is separated by the Gulf of Manaar and Palk Strait. Between the islands of Manaar and Ramiseram is *Adam's Bridge*, a ridge of sandbanks nearly connecting the island with the mainland. There are several channels through the sand, but none of sufficient depth to allow the passage of other than very small vessels. The area of the island is 25,360 square miles. The centre is decidedly mountainous. In fact, it may be "compared to one vast mountain; hill piled upon hill, and peak rising over peak; ravines of immense depth." The principal heights are *Pedrotallagalla*, 8280 ft.; *Kirigallapotta*, 7900 ft.; *Totapella*, 8000 ft.; and *Adam's Peak*, 7700 ft. This last is the most remarkable, from its conical form and the distance it is visible from the sea. From its sacred summit Buddha ascended to heaven, a gigantic footprint still being pointed out by his faithful followers as testimony to the fact. There are numerous rivers, but most of them are mere mountain torrents. The *Mahawelli-ganga* rises near Adam's Peak, and in its course of 134 miles drains 4000 square miles of country before reaching the sea near Trincomalee. Along the south-east coast are the *Kalapoons* or salt-water marshes.

The heat is less than on the neighbouring mainland, but in the low-lying tracts, covered with dense jungle, rank and luxuriant vegetation, the climate is extremely unhealthy; even the natives are not immune, and whole villages are swept away. Where the land is drained and cultivated the climate is salubrious and well suited to Europeans. The rainfall is three times that of England, though by no means evenly distributed during the year.

Productions.—With the exception of the tiger the wild *animals* are generally the same as those of India. The elephant in particular is noted for its great strength and, in captivity, its extreme docility. The animal was formerly very numerous, but continued hunting has greatly reduced the number, a remark which applies also to the bear, leopard, panther, monkey, and wild hog. "Ceylon can produce an enticing catalogue of attractions, from the smallest to the largest enemies to the human race—ticks, bugs, fleas, tarantulas, centipedes, scorpions, leeches, lizards, crocodiles, and snakes"; of the last-named there are quite thirty varieties, but only six are venomous.

The *vegetation* is marked by extreme luxuriance, in which it rivals any island of the East Indian Archipelago; even the mountains are clothed with verdure to their summits. Except along the banks of rivers subject to inundations the soil is generally poor, although peculiarly adapted for the growth of such shrubs as coffee, tea, cinnamon, and cinchona. Freshly cleared forest-land will yield but a single crop without manure. The forests yield nearly a hundred different kinds of woods, of which the best known are ebony, satinwood, calamander, suria (tulip tree), tamarind, jackwood, halmileel, palms, and breadfruit. Ceylon is particularly rich in palms; along the west and south coasts they extend for 120 miles without a break. The following varieties are the most useful:—

Cocoa-nut Palm.—This is almost indispensable to the natives. The pint of sweetish juice yielded by the nut is a delicious drink in a hot climate; the nut scraped into a pulp supplies rich cream; the sap provides toddy, a refreshing drink; and fermented toddy becomes arrack, a fiery alcoholic spirit. The kernels are pressed for their oil; the fibre of the husks is called "coir" of which very durable rope is made.

Poonac consists of nuts and kernels from which the oil has been expressed; it is used for oilcake for fattening cattle and poultry.

The *palmyra* provides excellent wood for rafters and spokes of wheels; and it also yields the finest jaggery, a rough sugar evaporated from toddy.

The *kittool palm* wood is very tough and pliable.

The *areca palm* is an elegant tree 80 feet high yet only 5 inches in diameter. Its nuts are like nutmegs in size and appearance.

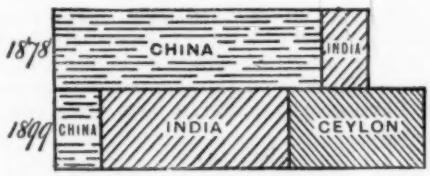
The *date palm* grows only to 3 or 5 feet and the fruit is useless.

The *sago palm* is not cultivated; it does not yield sago, but its nuts are ground into flour.

The *talipot palm* possesses remarkable circular fan-shaped leaves, tough and durable, which serve the natives for many useful purposes.

Coffee planting was formerly a very profitable occupation, and in the year 1879 over 82,400 cwts. were exported. The plants, however, became subject to a mysterious disease that for many years paralysed planting. In 1900 only 10,000 cwts. were exported. The failure of coffee caused planters to turn their attention to tea and cacao.

Tea.—The success of the Ceylon tea is one of the romances of modern colonial industry. Whereas the



British market used to depend almost entirely upon China for our supply of tea, India and Ceylon teas now practically monopolise our trade; and China tea has become almost a negligible quantity. The accompanying diagram shows what a revolution took place in the origin of our teas within the short space of twenty years.

Tea imported into United Kingdom (in million lbs.).

From	1878	1899	1900
China	166	35	21
India	35	143	154
Ceylon	—	102	114
Other countries . .	4	9	10

In the last-named year the exports of Ceylon tea to Russia rose by 5 million lbs.; to Australia, 2 million; and the United States, 1 million lbs.

Cacao.—The planting of cacao promises to become a valuable industry, as shown by the exports, which rose from 7000 cwts. of cocoa beans in 1885 to over 40,000 cwts. in 1900. The failure of coffee thus had its compensations in causing other industries to arise, and added to this coffee-planting is again meeting with increasing success.

Cinnamon is the bark of a species of laurel. It is cut into slices and dried in the sun. It is a delightfully fragrant spice, and also gives an aromatic oil more nearly approaching the consistency of vegetable wax. The Dutch reserved the trade in this spice as a govern-

ment monopoly, and all the spice that could not be exported at monopoly prices was destroyed. The English followed this system for some time, but in 1832 the trade was declared free except for an export duty.

Cinchona or Peruvian bark is the bark of a tree somewhat resembling the cherry-tree in appearance. It yields quinine, an invaluable medicine. A native of the eastern slopes of the Andes, it was introduced into India and Ceylon by the British government to provide a supply of quinine for the British troops.

Rice.—Although it is the chief article of native consumption, the cultivation of rice has been strangely neglected in modern times. Formerly the island was peopled by a dense population, and thousands of acres were devoted to the cultivation of this "staff of life," as proved by the remains of artificial lakes, tanks, &c.,

which supplied water for irrigation purposes. Government irrigation works are now reclaiming some of the rice lands, and the eastern province already produces more grain than is sufficient for local needs. Some day it will figure largely in the exports instead of the imports as at present.

Tobacco, *Rubber*, and *Camphor* succeed well, and they are receiving constantly increasing attention.

Minerals.

Among the minerals of Ceylon are gold, quicksilver, and iron, but plumbago or graphite is the chief product. It is not of so good a quality as that obtained from the Alibert mine in Siberia, and used in the manufacture of blacklead pencils; but it is much used for lubricating and polishing purposes, and for coating non-conducting substances in the electrical industry. Plumbago mining now suffers less from government restrictions, and with improved methods and appliances the output will increase rapidly. In the Kurunegala district, north-west of Kandy, there are over 150 mines.

So rich is the island in gems that it has been suggested as the "Ophir" of the time of Solomon. The richest gem district is in the south-west, near to Colombo. With the exception of the diamond, emerald, turquoise, and opal, nearly every precious stone is found in Ceylon; and what is stranger still, many of them may be dug out of the same pit. The gem-bearing strata is seldom more than 3 to 10 feet below the surface. The gem trade is chiefly in the hands of Mohammedans.

The *Pearl Fishery* of Ceylon has been famous for ages. It is chiefly confined to the Gulf of Manaar, especially the Bay of Condatchy. For long periods, sometimes as long as twenty years, the fishery is entirely unproductive. It is a government monopoly.

Manufactures.

The manufactures are practically of little importance. Many persons are employed in weaving, but the material is of the coarsest kind. There are oil-mills, where the palm kernels are pressed, and arrack distilling finds considerable employment. The gold and silver and lacquer ware are excellent. Salt, a government monopoly, is manufactured chiefly at the salt lagoons in the south, where there are five or six lakes of perfect brine. The government price is 3s. per bushel, but the salt is very impure. The salt revenue amounts to £40,000 per annum. It is an unfair tax on the natives, for it ought not to exceed 1s. per bushel. At the lower price the demand would increase enormously. At present hides are thrown away, as salt is too dear to allow of curing; and the fish trade would benefit largely with profit and advantage to the people.

People.

That the island once possessed a vast population is beyond all doubt. For several centuries it constantly decreased: in 1832 it scarcely exceeded a million; at the present time it is 3¾ millions. The people are very mixed, consisting of Cingalese, Malabars, Moors, Veddahs, Europeans, and their descendants, and negroes. The influx of Hindoos to work on the plantations accounts largely for the increase in population. The Cingalese are a slavish race. They are lithe and supple of limb, their black skins shine, their eyes sparkle with animation; but centuries of tyranny have given them a cringing, grovelling temperament. There is probably no black man who recognises the superiority of the white so readily as the Cingalese. Sir Samuel Baker gives us a by no means flattering description: "You see a native woman clad in snow-white petticoats, a beautiful tortoise-shell comb fastened in her raven hair; you pass her—you look back—wonderful! —she has a beard! Deluded stranger, this is only another disappointment; it is a Cingalese Appo—a man—no, not a man,—a something male in petticoats; a petty thief, a treacherous, cowardly villain, who would perpetrate the greatest rascality had he only the pluck to dare it. In fact, in this petticoated wretch you see a type of the nation of Cingalese."

The Mohammedans and Jews are energetic and industrious, and engage largely in the commerce of the island; they are the merchants, weavers, fishermen, and bankers. The Veddahs are the original inhabitants of Ceylon. They are a hardy race but inoffensive, and live generally in the most inaccessible parts of the island. Dutch, Portuguese, Chinese, and Parsees are numerous. The burghers are the descendants of Europeans and natives, and correspond to the Eurasians of the mainland. Altogether the population is as cosmopolitan as any that exists in any portion of the British Empire.

The late governor of Ceylon claimed that life and property were eminently safe, and a man or woman was safer in any part of the island than in Hyde Park. The proportion of murders is less than in the United Kingdom.

The Cingalese chew betel leaf incessantly. It belongs to the pepper tribe, and is a narcotic. The

leaves are covered with lime, made of sea-shell, and are chewed with slices of areca nut, the fruit of the areca palm. The habit is a decidedly unpleasant one to Europeans; it reddens the lips and blackens the teeth.

Commerce.

The total trade of the colony for 1903 amounted to £13,540,000, imports and exports in almost equal proportions. The chief exports to the United Kingdom were tea, £2,954,860; cocoa-nut oil, £554,760; cocoa, £156,217; plumbago, £119,316; cinnamon, £32,591. The chief imports from the United Kingdom consisted of clothing, cottons, coal, machinery and metals; total value, £1,440,284. There are 390 miles of railway open for traffic, and over 200 miles more are projected and surveyed. A railway scheme for connecting India and Ceylon *vid* Adam's Bridge is contemplated; the realisation of the plan would give the trade of Ceylon a great impetus.

Towns.

Colombo, the capital of Ceylon, was named after Columbus by the Portuguese. Since the construction of a great breakwater to improve the harbour, it has become the coaling station for large steamers instead of Galle. It has a fortress, which contains the chief stores, banks, mercantile and government offices. Colpetty is a beautiful suburb amid groves of cocoa-nut palms.

Kandy was formerly the capital of the island. It is situated on the shores of an artificial lake, 72 miles by rail from Colombo. There are Buddhist and Hindoo temples, and the ruins of the palace of former kings. At the Dalada Maligawa—"shrine of the tooth"—is a piece of coloured ivory, 2 inches long, and of the thickness of a first finger, supposed to be one of Buddha's teeth. It is the centre of a great annual festival.

Trincomalee, with a magnificent harbour, is a naval and victualling station, and the headquarters of the British fleet in East Indian waters.

Galle, or Point de Galle, is fortified, but has declined in importance since the improvement in Colombo harbour.

Rakwana and *Kalutara* are engaged in the gem trade, especially in the polishing and cutting of stones.

Hambangtotte is chiefly engaged in the salt trade.

THE HARMSWORTH ENCYCLOPÆDIA PRIZE COMPETITION.

AWARDS IN THE FIRST SERIES OF COMPETITIONS.

THE Editor regrets that the number of competitors in the first series of competitions fell considerably short of his expectations. However, the quality of the replies received was generally high, and it is hoped that those who took part in the competitions found them interesting and helpful. No doubt their excursions into the various parts of the *Encyclopædia* have increased their respect for it, and have made them so far acquainted with its contents that its value to them as a work of reference has been considerably increased. If this is so, every competitor will have materially benefited, whether numbered with the prize-winners or not.

(A) **Post Card Competition.**—The articles which appear most interesting to competitors in the order of votes are:—

In Part I.		In Part II.	
Agriculture.		Anthropology.	
Adam and Eve.	} equal.	Ants.	} equal.
Africa.		Alphabet.	
Admiralty.	} equal.	American Indians.	} equal.
Alexander the Great.		Archæology.	
Adulteration.		Angling.	

In Part III.

Architecture.
Army.
Arctic Explorations.
Astronomy. } equal.
Athletic Sports.

The best post card gives **eleven** out of the **twelve** most interesting articles, and gains the first prize with **84** out of a possible **91** votes.

The second best post card gives **ten** out of the **twelve**, with **76** out of a possible **91** votes.

First Prize, £2, 2s.—Miss Grace I. Messon, Headmistress, St. John Baptist High School, Newport, Monmouthshire.

Second Prize, £1, 1s.—Arthur H. Harris, Esq., Head Teacher, Council School, Newent, Gloucester.

(B) **Notes of Lessons Competition.**—The number of competitors was very disappointing. The second prize only is awarded.

Second Prize, £1, 1s.—Miss Sophie B. Somerscales, Head Teacher, Park Road Council School, Hull.

(C) **Question Competition.**—This proved by far the most popular of the three competitions, and a series of very excellent papers were sent in. We venture to think that the ex-pupil teachers and pupil teachers who competed have materially advanced their store of general knowledge by the investigations necessary to answer the questions proposed. No fewer than fifteen papers gave the answers all correct, and ten of them only fell short by one incorrect or omitted answer. Under these circumstances the prizes are divided between the following fifteen competitors, and 5s. will be sent to each of them:—

1. Eleanor Mary Clarke, Gordon Road Council School, Strood, Rochester, Kent. 2. Agnes Cooper, Royal Academy, Tain, Ross-shire. 3. Mary Isobel Craig, Harmony Row Public School, Govan, Glasgow. 4. Edmund Downs, St. Annes' Wesleyan School, South Reddish, Stockport. 5. Matthew F. Foulds, Public School, Prestwick, Ayrshire. 6. William J. Gould, Council School (Boys'), Wolverton, Bucks. 7. Mr. J. Hoffmann, The Children's Home School, Edgworth, near Bolton, Lancs. 8. Jessie Inglis, Riccarton Public School, Kilmarnock, Ayrshire. 9. Grace E. Kemp, Girls' Department, Hollington School, Hastings. 10. John Wm. Lawson, Greencroft Council School, Co. Durham. 11. Mr. F. J. Lewendon, National School (Boys'), Ilfracombe. 12. Edgar W. Ralph, Boys' British School, Poole. 13. Frederic George Rogers, Whitley Road Boys' School, Eastbourne. 14. Mabel A. R. Venness, Council Schools (Girls'), Hollington, Hastings. 15. Eva Whiting, Albert Road Girls' School, Southsea, Portsmouth.

The Practical Infant-School Teacher.

SUGGESTIONS FOR CARRYING OUT THE OCCUPATIONS IN CONNECTION WITH THE CORRELATED SCHEME OF WORK FOR AN INFANTS' SCHOOL.

July, Week I.

Clay Modelling.—This may be modelled in either of two ways. First, by rolling a piece of clay and marking it as shown in the illustration, representing the feet by simply pulling out small pieces of clay from underneath and moulding them into shape with the hands; or, secondly, as follows: roll eight or nine small balls of clay, some of them rather smaller than the others, place them in a line close against one another, the larger ones at one end and the smaller at the other; then press slightly together, so that all the balls become a little flattened. Finish by moulding the head on the front part, and pull out some small knobs for feet. The method last described is an exceedingly easy way of representing the caterpillar. It would be best placed on a slab of clay.

Brush Painting.—In the illustration the butterflies are made by means of brush-impressions placed close together. Another very good way of representing the form would be to outline with the brush, and then wash in the required colour. If the latter way is adopted it is of course easier to represent the exact colour, yellow with black markings for instance, as the second colour can be added after the first has dried.

Crayon Work.—Green and yellow are the required colours, with a touch of brown for the body of the butterfly. A good plan would be to make the buttercups a deeper yellow than the butterfly, simply by pressure, when using the chalk. The copy would of course be reproduced, and the children given one each to fill in.

WEEK I.—CLAY MODELLING: MOON DAISY.

WEEK I.—BRUSH PAINTING: DAISIES.

WEEK I.—CRAYON WORK: DAISIES.

Paper Cutting.—Either have this drawn and cut out, or cut from a piece of paper folded in half, as shown in the illustration. Begin at X and cut in the direction of the feelers, and round the upper part of the wing to O, and so on, taking the complete outline of one side, finishing at B. Open this out to show both sides.

Blackboard Drawing.—You can enlarge this considerably. Draw also the butterfly given for paper cutting.

Stick Laying.—This is quite similar to the minnow net given for May; the directions there given can be followed.

July, Week II.

Clay Modelling.—The easiest way to model this is to proceed as follows:—Take pieces of clay and roll them between the hands till about the thickness of a slate

WEEK I.—PAPER CUTTING: FLOWER-POT.

pencil; then, beginning from below, gradually build up the form of a beehive, taking the rolls of clay round and round to form a spiral. As the form is being built up

WEEK I.—BLACKBOARD DRAWING: DAISY.

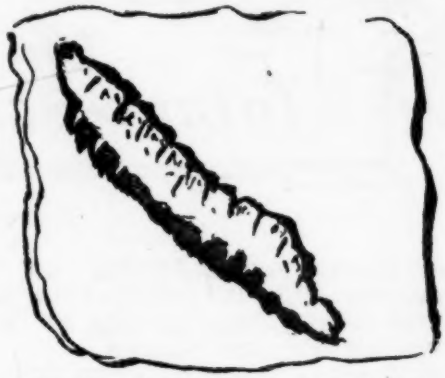
it should be made to slope inwards, so that it becomes smaller and smaller towards the top. The small hole can be inserted afterwards. In the other method the

WEEK I.—STICK LAYING: CAGE (IN STORY).

form of the beehive would be simply hollowed out from a ball of clay, and markings introduced on it to represent the straw of which the hive is made.

Brush Painting.—For these use brown paint. The wings may be represented by simple brush impressions placed two together First, carefully paint the body, legs, and head.

Crayon Work.—This is not so difficult as it looks. Use yellow, green, or brown crayons. Have a good large drawing on the blackboard, and talk to the



WEEK II.—CLAY MODELLING: CATERPILLAR.

children about each part first. Point out the bee, and tell the name of the flower. It would, of course, be best to leave the filling-in of the bee to the last.

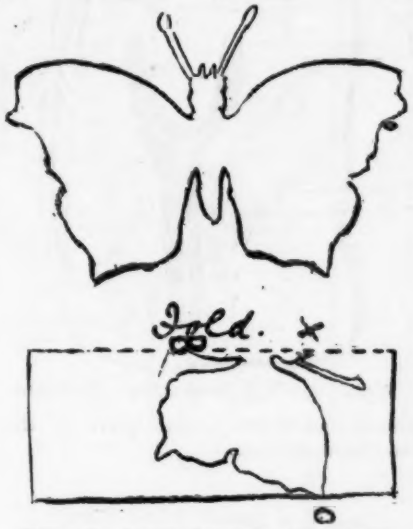
WEEK II.—BRUSH PAINTING: BUTTERFLY.

Paper Cutting.—This is a straightforward piece of work when it has once been drawn. If the blackboard drawing lesson precedes this, the children will have had

WEEK II.—CRAYON WORK: BUTTERFLY ON FLOWER.

some practice, and may be able to execute it on paper without much trouble; when cut out, some pencil markings should be introduced. This will finish it nicely.

Blackboard Drawing.—To begin with, this is a good exercise in drawing an oval for the hive-stand. Before drawing the hive, rub out the further side of the oval.



WEEK II.—PAPER CUTTING: BUTTERFLY.

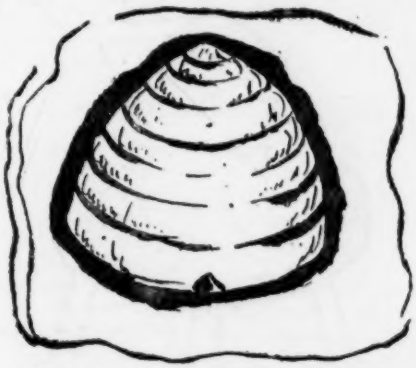
July, Week III.

Clay Modelling.—There is no difficulty whatever in executing this, but it would be well to notice the proportions. The handle needs a good stout roll of clay; whereas the part representing the fork must be more slenderly made.

WEEK II.—BLACKBOARD DRAWING: CATERPILLAR ON BRANCH.

WEEK II.—STICK LAYING: BUTTERFLY NET.

Brush Painting.—This looks well in two shades of green; a somewhat deeper shade for the leaves at the base of the stem than for the flowering grass. The plaintain head should be represented brown, as it is usually of quite a dark colour when ripe. For the feathery-looking grass, use a pale green, and put on the



WEEK III.—CLAY MODELLING: BEEHIVE.

colour with the finest brush point. It would be quite easy to darken the leaves at the base, by passing the brush over them a second time, so that actually two

WEEK III.—BRUSH PAINTING: BEES.

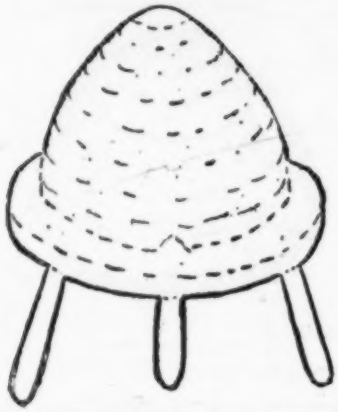
shades of green would not be needed; but the first wash of colour must be dry before the second is put on, or it is of no use.

WEEK III.—CRAYON WORK: BEE ON FLOWER.

Crayon Work.—This is an easy exercise. Yellow and green are the colours to use. Fill in the haycocks with a pale green, and then the ground with light

touches of yellow. The effect will be spoilt if too much colour is put on.

Paper Cutting - This has been previously described for another lesson; it could be done from memory.

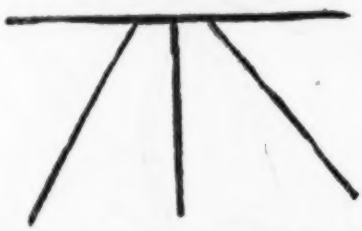


WEEK III.—PAPER CUTTING: BEEHIVE.

Blackboard Drawing.—This will be an interesting lesson, and afford an opportunity for conversation. The various stages of hay-making are depicted in the week's series of lessons.

WEEK III.—BLACKBOARD DRAWING: BEEHIVE.

Stick Laying.—This has been previously described in the lesson for October, Week II.



WEEK III.—STICK LAYING: STOOL FOR HIVE.

July, Week IV.

Clay Modelling.—This is generally a successful model. A slab is a great improvement. Roll a small ball for the centre, then take small pieces of clay and flatten each one out; point somewhat at one end, and place the other end just under the ball of clay which forms the centre. You will require ten or twelve of such pieces. When this is done, roll a piece of clay

WEEK IV.—CLAY MODELLING: HAYFORK.

for the stalk, and flatten a small piece for the leaf as shown in the illustration.

WEEK IV.—BRUSH PAINTING: GRASSES.

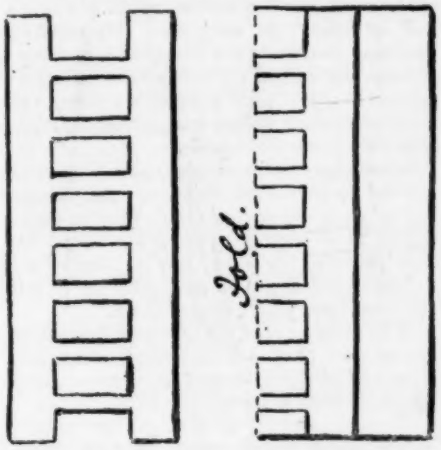
Brush Painting.—This may be painted all yellow, or yellow centre and white ray florets. It is best repre-

WEEK IV.—CRAYON WORK: HAYCOCKS.

sented by means of brush impressions; when painting the centre, leave a speck of white.

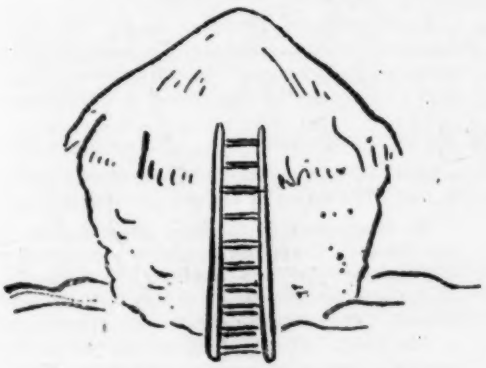
Crayon Work.—It would be a good plan to repro-

duce this on brown paper; then the daisies may be coloured white; otherwise they should be represented



WEEK IV.—PAPER CUTTING: LADDER.

yellow. Use green for the leaves and stems, also for the bracts, often incorrectly called the calyx.



WEEK IV.—BLACKBOARD DRAWING: HAYSTACK AND LADDER.

WEEK IV.—STICK LAYING: LADDER.

Paper Cutting. — This will be drawn first, and then cut out; it is also very easily done from a piece of folded paper — the fold will be along the centre of the pot.

Blackboard Drawing.—Do not fail to draw from a natural specimen. Take one yourself, and help the children to find out the essential points. Enlarge upon this considerably, it will be an exercise in proportion.

Stick Laying. — Three sizes of sticks are required for this. Let the children lay the two forming the bottom of the cage first, so that an angle is obtained — the rest is easy.

SCHOOL GARDENING FOR LITTLE CHILDREN.

BY LUCY R. LATTER.

PART VIII.

"He breaks no thread His hand has spun."

IN this paper I purpose showing how the Insect-life of a garden may be dealt with in school, and what a vast store it provides for the rest of the school work to draw upon. It will then perhaps be seen that the difficulty which such a subject often seems to present, is more apparent than real.

The children continually meet with insects of all kinds when working in the garden, and a great desire is awakened in them to know something about the delicate little creatures flitting here, there, and everywhere, as is evinced by their eager questions and expressions of wonderment. Insect-life is a subject, therefore, which involuntarily presents itself there for consideration. It is simply a question of selecting to the best advantage from the vast store of material at our service.

The large White Cabbage Butterfly (*Pieris brassica*) was the first insect visitor to our garden to come under our special consideration. It afforded material for thought and work one September and October and part of the following May.

B. II.*—The Standpoint from which the Subject was considered with the Children.

"Wending
Its way from flower to flower,
Like a free and happy spirit."

The previous June and July, the Cabbage (*Brassica oleracea capitata*) had occupied our special attention. During that time the children noticed some of the graceful visitors to the cabbages in the school-garden, amongst others the large White Cabbage Butterfly (*Pieris brassica*). As this little creature seemed particularly attractive to the children, it naturally suggested itself as the subject for our special consideration the ensuing months. Our selection of the subject was further determined by the fact that the Cabbage Butterfly is a frequent visitor to our garden, broods or generations of it appearing in the Spring as well as in the Autumn. Its graceful form and delicate colour render it peculiarly attractive, and its life history is as fascinating as a fairy tale, nay, the change of outward form as the inner life develops uninterruptedly is one of Nature's beautiful symbolisms, and every child should possess it. There is no break in the story. The egg yields the caterpillar, which stores up strength and substance in the form of germ cells for the benefit of the chrysalis, in which all the powers, organs, and form of the butterfly are essentially and actually developed. The chrysalis finally casts its skin and unfolds parts previously concealed and immature; first the limbs, by-and-by the wings opening more and more, till the idea of the perfect insect is attained. Thus are butterflies true and beautiful "emblems of our own great resurrection."

* In the method of procedure, see Article IV., November 1904. A = Experience with the real thing; B = Notes or information for the teacher.

Furthermore, in following the life of a butterfly, we are again brought face to face with one of the greatest truths in the Philosophy of Nature, namely, that "all living things exist, and feed, and grow, and gather strength, in order that they may perpetuate their race." The glory of God consists in the maintenance and increasing multiplication of receptacles of His life.

Another truth is also exemplified for us in the life of the butterfly, namely, that the continual purpose of life is "to obtain a point of departure for renewed progress, pushing out of the way whatever may obstruct," so that Reproduction and Death are but the struggle of life with itself to attain a higher form.

These are truths of which the child can get but a glimmering now in his partnership with Nature; but who shall say that later on they may not reverberate in him with ever-increasing strength and beauty, and make the purpose of life seem one grand, vast whole, having its beginning and end in the Divine Love and Wisdom?

"Life's more than breath and the quick round of blood;
'Tis a great spirit and a busy heart.
We live in deeds, not years; in thoughts, not breaths;
In feelings, not in figures on a dial.
We should count time by heart throbs. He most lives
Who thinks most, feels the noblest acts the best."

B. III.—Plan of Work with the Children.

Insect visitors to the garden during the past months recalled. The kind of day on which they seemed to like to come out. The beds they seemed mostly to visit. Perhaps there may be some insect visitors in our garden to-day as it is so bright and fine.

Visit to the garden. Some butterflies found flitting about among the flowers. A pretty creature with red and black markings on its body noticed on a sunflower, several whitish-looking creatures on the cabbage beds. Two of these latter butterflies seem very busy. One is evidently trying to find a nice resting-place, the other is mounting guard over her. See, she has settled on a cabbage leaf! How strange that she has chosen the under side of it! Something wonderful must be going to happen. Perhaps we shall be able to find out by-and-by what the butterfly does when she settles thus upon a cabbage leaf. A small cluster of tiny golden yellow eggs found later and taken into school (on the leaf on which they were laid) and placed in a larva house to be taken care of and watched from day to day.

The Butterfly's Eggs.

The way in which they have been laid upon the leaf. Their beautiful colour. Their size and number (few or many). The loving care the mother butterfly took to secure a place for them where they might be protected against rain and the hot rays of the sun, as well as hidden from the eyes of anybody who might hurt them when she had to leave them. By-and-by we may perhaps be able to find out why she chose a cabbage leaf for her babies' cradle. Meanwhile we must take great care of the little creatures.

Examination of the eggs in the larva house. Changes in them noticed from day to day.

Other little creatures have been visiting our garden. How do we know this? How is it we cannot always see these little creatures at once?

Another visit to the garden. No butterflies seem about now. The children find, however, that some other little creatures have been in the garden. The cabbages in one bed are all spoilt. The leaves are full of holes. In some cases only stalks and ribs remain. Somebody has been feeding on our cabbage plants. Individual children search among them, and after a time find some small caterpillars. Where?

† Caterpillars taken into school to be kept and watched there a little while.

Some empty (jam or other) glass jars fetched and cleaned by individual children. A little moist earth as well as plenty of food (kind?) put in each. Caterpillars then carefully put in the temporary homes thus prepared for them, and a piece of white leno fastened over the top of each glass jar to prevent the little creatures from straying away.

(The children tend the creatures throughout, taking special care that their temporary homes are always clean and nice, and dusty leno covers replaced by new ones from time to time.)

The Young Larvæ, and the Caterpillars or Older Larvæ of the Cabbage Butterfly.

Something very strange has been happening to our butterfly eggs. Some curious little grubs have come in the place of the pretty little golden eggs. They make us think of some of our caterpillars.

Examination of the larva house. The butterfly eggs found to be all hatched. The emerged larvæ are compared with some of the caterpillars brought in later from the garden, and found to be like them.

What the Caterpillars do. * How they Feed.

The kind of food they like. *Their strong jaws, how they move. The quantity of food the creatures eat.

The caterpillars in the larva house and the glass jars watched. The riddled condition of the leaves after even one day's feeding noticed. Fresh cabbage leaves given to the creatures, and the way they eat carefully noticed. (The stretching of the body. The advancing of the head. The applying of the mouth to the margin or some other portion of the leaf. The regular way in which the creature eats away the leaf, always starting from the farthest point which can be reached by the advancement of the head, and then gradually moving round to the nearest point, when it again extends its mouth to the point whence it began to eat, and repeats the same process, a little "slice" being devoured each time. The quick and peculiar movement of the jaws observed.) The children can now perhaps tell why the Mother butterfly chose a cabbage leaf for her babies' cradle.

How the Caterpillar moves. * How it Breathes.

Unless disturbed it moves lazily and does not make long journeys. It climbs up the stalks of plants.

The arching of the body in moving.

Individual caterpillars watched and their movements described. (One caterpillar for every two children will suffice. Each of the specimens to be

† Whilst caterpillars of various kinds were brought in from the garden and elsewhere, those of the large White Cabbage Butterfly were the subject of our special consideration in this plan of work.

* Points with an asterisk against them are only for the upper part of the school.

distributed among the class in this and subsequent lessons must, for the sake of the creature, be put in a sand or modelling tray with a little cabbage leaf).

The children notice the breathing holes. They find out their number.

The Form, Covering, and Colour, &c., of the Caterpillar.

The cylindrical shape of the body. The number of segments. The soft covering. Its pretty colour, bluish-green with black dots and a yellow stripe on the back and on each side.

Individual caterpillars distributed for examination as before. The children pass their finger gently over the body and notice its softness and colour. They count the segments. The children can perhaps now say why it was so difficult to find these caterpillars on the cabbages in our garden.

The Legs of the Caterpillar.

Their number and where placed. The difference between the thoracic legs and the pro-legs; the need for the latter.

Individual caterpillars distributed for examination as before. The number of legs counted and the segments on which they are placed described.

The children let the little creatures move up and down and along their fingers. Difference in the legs noticed. Some of the "legs" (the hind or false ones) seem to help the little creatures to come down "hill" without tipping over. They also help them to creep along the under surface of leaves, &c. The caterpillars are replaced in the glass jars and larva house and then watched there. The children notice them moving up and down the glass, and over the leno covering.

The Caterpillar's Head.

The shape and colour. * The mouth and its wonderful arrangement for spinning silken threads. The eyes, their number and kind. Where placed on the head. (A good drawing useful here.)

Individual caterpillars examined as before.

The Growth of the Caterpillar.

The caterpillar grows so rapidly that its "coat" often becomes too tight for it, and it is obliged to cast it off and get a new one. It has to get quite a number of new "coats" while it is growing.

The children examine the glass jars in which the caterpillars are being kept in school. They find some empty "coats." Particular caterpillars are now watched from day to day to see how often they change their "coats" before they are full grown. The empty coats are saved.

Twigs are now placed in the caterpillars' temporary homes.

The Way the Caterpillar prepares for its Long Sleep.

Something curious seems to be happening to some of our caterpillars. They are restless. They are getting a different colour and losing their appetite. Some of them seem to be trying to fasten themselves to the top of the glass of their temporary home by means of strong silky threads which they are spinning. Others are trying to secure themselves in like manner to some of the twigs the children put in the glass jars the other day. These little caterpillars evidently now want to find a place for themselves above the earth. Can the children think why they should do this? What would they do if they were out in the garden and wanted to find a secure place for themselves there above the ground?

Examination of the full-grown caterpillars. The children watch them fixing themselves to the top of the glass jars and the larva house as well as to some of the twigs previously arranged therein, as often as possible. They notice that when the caterpillars have made themselves quite secure they throw off another coat and go to sleep.

The Appearance of the Sleeping Caterpillar or Chrysalis (or Pupa), as it is now called.

Chrysalides examined very carefully. Their beautiful shape and colour noticed. (A small hand magnifying-glass may be used here with advantage.) How securely the little creatures seem suspended in the glass jars and the larva house by the fine strong silk threads which they spun round themselves when preparing for their long sleep! If they were out of doors they would often be rocked to and fro by the wind.

* The Meaning of this Chrysalis Sleep.

A preparation for a higher and more beautiful form of life.

The children look after the chrysalides all the winter. They continue to keep the temporary homes of the little creatures as nice as possible. They put fresh covers of leno when the old ones are dirty. They clean the inner as well as the outer side of the "walls" of the "homes," and if necessary renew the little notices which tell the names of the inhabitants, and when they came to live thus in the school.

This must all be done very carefully in order that the chrysalides may not be disturbed whilst they are sleeping, and may be—dreaming "a wonderful dream of delight."

(*To be continued.*)

Messrs. Ward, Lock, & Co.'s Guide-Books.—The holiday-maker as a rule is unwise if he attempts to make a first-hand exploration of the district in which he decides to centre himself. Those who keep on the move invariably avail themselves of the labours of those who compile guide-books and map out their course beforehand; they would miss a large percentage of their enjoyment if they did not. How many visitors to the seaside do nothing but walk down to the beach and back to meals simply because they do not know what pleasures can be found in their immediate vicinity. Expense cannot be urged as the excuse, for Messrs. Ward, Lock, & Co. have issued for the small sum of one shilling a Guide to each of the popular resorts, whether on the coast or inland, of England and Wales. The series includes six to Scotland, eight to Ireland, and four to the Continent. The illustrations are beautiful, and the information is reliable and set out in such an interesting manner that, apart from their value as guides, the books will afford entertaining reading at any time.

OUR TUTORIAL SECTION

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Late Principal of the Belvedere Pupil Teacher Centre, First on Scholarship List; Author of "Scholarship School Management," "Building of the British Empire," etc.

SCHOLARSHIP COURSE FOR DECEMBER 1905.

Seventh Month—July.

Work to be Prepared.

1. *Reading and Repetition.*—Steady oral practice must be taken. Both subjects require study and perseverance, and full marks will not be secured without this.

2. *Teaching.—The Teaching of Arithmetic.* Chap. vii.—*Scholarship School Management.*

Arithmetic is, of all the school subjects, the most valuable as a means of mental training if it is taught properly, otherwise it is continual worry to both teacher and taught. The fundamental principle to be grasped by the young teacher is that the subject is one which evolves itself from a very few simple axioms. It is not a collection of rules without connection or correlation which have to be committed to memory and applied in a mechanical manner, but every law and rule can either be educed from what has gone before, or may be deduced from simple examples. The subject, in short, is a long and easy slope, and not a succession of steep steps. Once this is clearly understood the whole method of teaching becomes easy. A child should never know that it is learning a new rule, the examples chosen must be so easy and apparent that they can be solved at once, difficulties must be introduced gradually, and reasoning must be a large part of every lesson.

The neglect to make children understand what they are doing is responsible for most of the mistakes. If a child applies a rule mechanically and without thought it is merely wasting time. Few of the sums taken in school are met with in ordinary life, and the sole reason they are taught is to train and develop the reasoning and judgment, and not primarily to get sums right. Hence it follows that every lesson must be conceived and carried out with this object in view, and the lesson is a success or a failure in proportion as it has compelled thought or neglected it. It not unfrequently happens that the young teacher is none too sure of the theory and principles underlying what he is attempting to teach, and that in his anxiety to produce a large number of "sums right" he fails entirely in imparting genuine knowledge.

It is impossible in a few notes to explain every point in the subject—that is done in the text-book—but it is very necessary to emphasise the ideas given above. The subject must be very carefully studied, and the rules applied in everyday teaching.

The following are a few questions which indicate the view of the subject which a student should take.

(1) How would you teach children numeration and notation? Work in figures three billions three hundred thousand, and three millions thirty thousand and three.

(2) How could you prove that 7 times 9 = 9 times 7?

(3) Explain exactly the principle in subtraction often called "borrowing and paying back."

(4) Is it necessary when multiplying 3456 by 289 to commence with the 9? Work the sum, taking the figures in the order 2, 9, 8, and again in the order 9, 2, 8.

(5) Multiply 2965 by 9612 in two lines.

(6) Explain the difference between long and short division.

(7) A number is divided by factors 6, 7, 8. The remainders are 3, 5, 4. What is the total remainder? What would the remainders have been had the factors been taken in the order 7, 6, 8?

(8) Why, in dividing one fraction by another, should you invert the divisor and multiply?

(9) How is it that when one proper fraction is divided by another the quotient is greater than the dividend?

(10) Give an outline of a first lesson on fractions.

(11) How would you teach children who have found a number which they think is the L.C.M. of 3, others to prove that it is the L.C.M.?

(12) Multiply 312·5 by 1·253 so as to show the exact value of every line in the working.

3. *Drawing.*—Two copies each week, one from a photograph and the other from nature. The latter need not be elaborate: a careful study of a simple flower, two or three leaves, &c., will give material assistance in understanding the photograph. Work with your brains as well as with the pencil. The specimens submitted are fairly good, the chief defect being a lack of freedom in the extraction, the lines are thin and wiry, not smooth and flowing, the lining-in is apparently a labour, and in some cases still the specimen is too small to be of any use at all.

4. *Music.*—Tonic Sol-fa. Bridge notes and first removes of key.

5. *Penmanship.*—Work a page daily in the *Practical Teacher Copy Book*, and use great care at all times. Good ink, good pens and paper, correct attitude and freedom of movement are essentials. This is the subject in which more marks are thrown away than in any other.

6. *Composition.*—Work one or two essays each week on such subjects as:—

(*a*) "Familiarity breeds contempt." How far is this true?
(*b*) The month of July.
(*c*) The reasoning power of animals.
(*d*) What is a great man?
(*e*) The misery of being old and ignorant.
(*f*) The rise of the newspaper.
(*g*) Canada as a field for emigration.
(*h*) The power of habit.

Think your subject well over before commencing to work. Draft a skeleton plan or outline, and write in your best language, avoiding a too childish style on the one hand, and a stilted, artificial mode of expression on the other. The following hints may assist you:—

(*a*) The truth of this depends to a very great extent on the object with which one is familiar. Many things are most attractive at first because the superficial obscures the real, and a closer acquaintance reveals the defects which were before hidden. In this case, and similar ones, it may be true. But, on the other hand, a certain amount of contempt may be felt for a person, a book, a picture, as the result of the first and erroneous impression which familiarity not only destroys, and supplies in its place an admiration and appreciation which increases with the growth of knowledge. In this case it is *not* true.

(*b*) An exercise in word painting, requires no assistance.

(*c*) This subject may require some amount of preparation. We can only infer that animals reason by their acts, and even then it is easy to be deceived by what is really instinct. A beaver builds a dam and makes a secure home; this at first sight may seem reason, but when a beaver in confinement does the same thing it is evident that it is instinct, for if the animal could reason it would see the futility of making a dam in a corner of a room. But there is no doubt that animals *do* reason, and a little thought will produce many instances of this. A dog that has done wrong will show that it fears punishment; a fox will sham death in order to escape, &c.

(*d*) Give your own ideas as to the exact meaning of the word "great," and give instances from history, &c., to verify your meaning.

(*e*) Old age may be a very happy period or the reverse. When youth and the prime of life have been spent in good genuine work, the body made strong by judicious exercise, the mind stored with wisdom, the autumn of life is pleasant. Retrospection and reminiscence take the place of action and anticipation. But when the mind is a blank, destitute of any happy memories, with nothing to think about, old age is burdensome and life not worth the living.

(*f*) and (*g*) Sufficient material was given last month.

(*h*) Habit is the tendency to repeat what has already been done, and the greater the number of repetitions the greater the tendency, until it is stronger even than the will itself. The beginning of a habit is unnoticed, and it may not be till it challenges the power of the will that its presence is recognised. Hence point out the necessity of watching growing habits, eradicating bad ones, and cultivating the good.

7. *English.*—(1) Learn 15 roots and meanings each week.

(2) The writers of the early nineteenth century.

(3) *Henry V.*, Act iii., Scenes 6 and 7.

(4) Prepare thoroughly the Essay on Gardens.

(5) The grammar of the Conjunction and Preposition.

Notes.—(1) The two scenes in the play set for this month offer no particular difficulty. They afford a contrast between the lighter talk of the English and French camps. The contempt for the English and the certainty of their capture by the French is well illustrated in Scene 7, and though a little overdrawn, are nevertheless historically accurate.

(2) The Essay on Gardens is most interesting, as it indicates the various flowers and fruits which were commonly cultivated in Tudor times, and also the Tudor idea of a formal garden. It is an interesting side-light on Bacon's character that he should have thought out the details of a subject which one would hardly suspect him to be familiar with. The other essays are quite in keeping with his life and position, but this one shows the many-sidedness of the man. It is a very interesting exercise for the student, and one which helps materially with the essay, to draw the place, such as Bacon suggests it should be.

(3) The syntax of the Preposition is easy. It shows the relation between (*a*) two nouns; (*b*) a noun and verb; (*c*) an adjective and a noun—*e.g.* Bread is *good* for *food*; (*d*) a verb and pronoun. Note also that the Preposition may have for its object an Adverb, *e.g.* He jumped from here to there; or an Adverbial Phrase, *e.g.* He *from* on high hath heard.

Note also the following:—

Beside = by the side, and has reference to place—He walked beside me.

Besides = in addition to, *e.g.* There was no one present besides me.

Many words originally Participles are used as Prepositions, *e.g.* concerning, considering, during, notwithstanding.

In *amid, amidst; among, amongst*, the second form is stronger than the first, as a little thought will show.

Note also the old Preposition *an* now contracted to *a*, as in I go *a* hunting, He went *a* fishing. In these cases *a* is a Preposition governing the gerund following. The word is still retained in dialect, *e.g.* What are you *a* doing? Where be you *a* going? &c., although it has fallen out of use in modern language.

Conjunctions.—Learn a correct classification. Conjunctions are generally classified on two distinct bases—(*a*) Co-ordinate and Subordinate, according as they join sentences of equal or different rank; and (*b*) according to the meaning of the sentence following—Simple, Adversative, Conditional, Hypothetical, &c. Some conjunctions are used in pairs, *e.g.* Either—or, though—yet, so—as, &c. These are called correlative.

Than and *as* sometimes present a difficulty, for the error is frequently committed of putting the Objective after them when the Nominative should be used; *e.g.* John is taller *than* him; I shall do the same *as* her. This should be—John is taller *than* he is tall; I shall do the same *as* she does. But the Objective is not always wrong. Take the sentence, I like you as well as him; this = I like you as well *as* I like him. When parsing it is always necessary to supply the parentheses before deciding on the exact work of the word.

8. *Geography.*—(*a*) The remaining American possessions.

(*b*) Revise Africa—outline, relief, climate, and productions.

Draw up a table showing the productions, towns, and government of the British West Indies and Central America.

In revising Africa, draw a large outline, fill in the names of all places to be remembered. Make a special study of the river basins. "The explorations in Africa have been the solutions of river problems." What does this mean, and how far is it true? Do not confuse the Sahara and the Soudan, and call them both deserts.

9. *History.*—Edward II. and Edward III.

The reign of Edward II. is without a redeeming feature; his weakness of character is evidenced by his choice of unworthy favourites. Learn concise lives of Piers Gaveston and the Despensers. Note the Lords Ordainers (eight earls, seven bishops, six barons), a committee which took all power out of the king's hands.

The loss of Scotland was inevitable under such a king. The Battle of Bannockburn should be carefully studied *with a plan.* Without the latter it is impossible to understand how Bruce with a very inferior army could defeat such a host as was opposedto him. Edward's deposition and death at the hands of his wife—"the she-wolf of France"—was a natural termination to an ignominious life.

Edward III.—An attempt to regain control of Scotland failed, although the English were successful at Halidon Hill. The most important feature of the reign is the war with France—the Hundred Years' War which made France for many years our enemy. The causes of the war must be studied carefully. The majority of students give the cause as Edward's claim to the throne. This is not so. There was considerable ill-feeling between the two countries. The French had helped the Scotch, had attacked English shipping in the Channel, and had ravaged some of the coast towns. But the main cause of the war was the state of affairs in Flanders (now Belgium). The great towns of Flanders were the chief market for English wool—the *staple* export—from which the king derived a considerable part of his revenue. They had revolted against their feudal superior, the Count of Flanders, who, unable to subdue them, had called to his assistance the King of France. Had the latter been successful the export trade of England would have suffered seriously, and Edward went to the assistance of the Flemings. After hostilities had commenced Edward put forward a claim to the throne, mainly to secure the assistance of some of the Barons in the north of France. The claim was weak and invalid. Supposing the principle put forward were admitted, viz. that a son could claim through the mother, then Edward was in no better position, for there were several who stood before him.

The war is remarkable for three brilliant victories—(1) Sluys, 1340, the first of a long series of naval victories; (2) Crecy; and (3) Poictiers. In the two latter the truth was clearly established that a resolute body of footmen were more than a match for an army of horsemen. Poictiers was won by careful choice of ground and skilful generalship. Plans of these battles must be learnt. The battle of Neville's Cross was the result of a Scotch invasion prompted by sympathy with the French. Learn a life of the Black Prince. The end of the reign was unhappy. The Black Prince was dead, the old king got into the hands of unworthy favourites, and the government went wrong. The misrule was partly rectified by the Good Parliament.

Two statutes of great importance were passed during the reign:

(*a*) Statute of Provisors, which made it an offence to accept a living in the English Church at the hands of the Pope.

(*b*) Statute of Treason, which limited the crime to six distinct acts. Previous to this it had been vague. As the king secured the estates of any one convicted of treason, it was to his interests to make the term as wide as possible, as it was to the barons to narrow its application.

The Black Death and Statute of Labourers were also important, and had considerable effect upon the social condition of the poor—on which topic a note will be given next month.

10. *Arithmetic.*—Profit and Loss. Work the examples in the text-book. Take care in all cases to take the cost price as 100. The solution in the majority of cases is to find a proportion, two terms of which are in ratio as abstract number; the third is a given price, *e.g.*—

A sold a horse to B, gaining 7½ per cent.; B sold it to C for £70, 19s., gaining 10 per cent. What did A pay for the horse?

Suppose A paid £100. Then he sold it to B for £107·5. B sells to C for £107·5 + $\frac{1}{10}$ of £107·5 = £118·25.

The proportion is as 118·25 : 100 : : £70, 19s. 0d. : x.

Or stating by method of unity—

Cost price of 118·25 = £100

" $1 = £\frac{100}{118{\cdot}25}$

" $70{\cdot}95 = £\frac{100 \times 70{\cdot}95}{118{\cdot}25} = £60.$

11. *Algebra.*—Quadratic equations with literal coefficients and problems leading to quadratics.

Work the following paper:—

(1) Write down the equations whose roots are 3 and − 4; 5, − 3, 0; $5 - \sqrt{7}$ and $5 + \sqrt{7}$; $a - \sqrt{b}$ and $a + \sqrt{b}$.

Ans. $x^2 + x - 72 = 0$; $x^3 - 2x^2 - 15x = 0$; $x^2 - 10x + 18 = 0$; $x^2 - 2ax + a^2 - b = 0$.

(2) Show that if a, β be the roots of $ax^2 + bx + c = 0$, then $\frac{1}{a} + \frac{1}{\beta} + \frac{b}{c} = 0$.

(3) For what value of a are the roots of the equation $3x^2 + 4x + a = 0$ equal to one another. Ans. 3 or -5.

(4) $\frac{x+3}{x+1} + \frac{x-6}{x-4} = \frac{x+4}{x+2} + \frac{x-5}{x-3}$. Ans. 1.

In working this sum it is useless to find the L.C.M. and free of fractions at first. Divide each denominator with each numerator and put down the result. Then the sum becomes—

$$\left(1 + \frac{2}{x+1}\right) + \left(1 - \frac{2}{x-4}\right) = \left(1 + \frac{2}{x+2}\right) + \left(1 - \frac{2}{x-3}\right).$$

The two 1's on each side cancel, so that

$$\frac{2}{x+1} - \frac{2}{x-4} = \frac{2}{x+2} - \frac{2}{x-3}.$$ Divide each side by 2.

$$\frac{1}{x+1} - \frac{1}{x-4} = \frac{1}{x+2} - \frac{1}{x-3}.$$

$$\frac{(x-4)-(x+1)}{(x+1)(x-4)} = \frac{x-3-(x+2)}{(x+2)(x-3)},$$ or

$$\frac{-5}{(x+1)(x-4)} = \frac{-5}{(x+2)(x-3)}.$$ Divide by 5.

$$\frac{1}{(x+1)(x-4)} = \frac{1}{(x+2)(x-3)},$$ or

$$(x+1)(x-4) = (x+2)(x-3)$$

$$x^2 - 3x - 4 = x^2 - x - 6$$

$$2x = 2$$

$$x = 1.$$

Women. Work any examples on the first four rules, and work the following paper :—

1. Simplify the expression—

$$2\left[x - 3\left\{x - 4\left(x - \overline{\frac{5}{6}x - a}\right)\right\}\right].$$

Also add—

$(\overline{a-b}\,x - \overline{b-c}\,y) - (\overline{a+b}\,x + \overline{b+c}\,y)$ to $ax + cy + b(x+y)$.

Ans. $24a$; $(a-b)x - (b-c)y$.

2. If $a = 2$, find the numerical value of

$$a^{2a-1} + 2a^{a-a} + (2a-1)^a.$$ Ans. 21.

3. The product of two algebraical expressions is $4a^2b^2 + 2(3a^4 - 2b^4) - ab(5a^3 - 11b^3)$, and one of them is $3a^2 + 2ab - b^2$; find the other. Ans. $2a^2 - 3ab + 4b^2$.

4. Show that $\frac{x^6 - y^6}{x^3 - y^3} = (x-y)(x^2 + xy + y^2)$.

12. *Euclid.*—Book I., Props. 29–34, with 4 deductions each week.
Women.—Propositions 20 to 24, with 2 deductions each week.

13. *Science.*—Elementary properties of carbon, iron, mercury, water, carbon dioxide, and lime.
In each case arrange your notebook thus—
(1) Occurrence.—Does it occur free in nature, or in combination, or in both ways?
(2) Preparation.—How can it be formed chemically? Sketch any apparatus necessary in producing it.
(3) Properties.—Note each, and experiments which may be worked to show them.
(4) Chief compounds.

14. *Spelling.*—Learn 100 words per week from "Words Commonly Misspelt," Series C or D.

Test Questions.

1. Write as a specimen of copy-setting :—
(*a*) Large Hand—Systematically.
(*b*) Small Hand—
To-night in Harfleur will we be your guest,
To-morrow for the march are we addrest.
2. *English*—
(1) Write out a classification of Adverbs, giving examples of each.
(2) Compare the state of literature at the beginning with that at the end of the eighteenth century.
(3) Analyse the following, and parse words in italics :—
(*a*) And *let* him *say* to England that we send
To know what willing ransom he will give.
(*b*) The Dauphin, *whom* of succours we entreated
Returns *us* that his powers are not yet *ready*
To raise so great a siege.
(4.) Discuss the structure and derivation of the following words:—inevitable, confederation, atheism, discontentment, regal, symphonious, annals, afield.
3. *Geography*—
(1) Explain exactly what is meant by Dominion of Canada. How is it governed? and how does its government differ from that of Australia?
(2) Describe a journey by the Canadian Pacific Railway from Ottawa to Vancouver.
(3) Draw a sketch-map of the East Indies, and give a full description of one island.
(4) A traveller proceeds overland from Calcutta to St. Petersburg. Explain which railways he would use, and the chief places passed.

PUPIL TEACHERS' COURSE

For Candidates' Examination, 1906.

Work to be Prepared.

1. *Reading and Repetition.*—Ten minutes' daily practice should be given to these subjects before a competent critic. The mere repetition of words is not enough; the spirit of the piece must be correctly interpreted.

2. *English.*—(1) Learn 10 roots and meanings each week.

(2) The grammar of the Verb. This must be very thoroughly done. A great deal depends upon learning good definitions. As it is very difficult to "make up" a correct definition, all students should copy into their note-books the definition in the text-book and commit it to memory. The definition of following terms must be known:—Verb: irregular, regular, transitive, intransitive; Voice: passive and active; Mood: indicative, infinitive, subjunctive, imperative; Tense; Participle; Gerund. If this is done properly many difficulties disappear. The subjunctive mood will require especial study, care being taken to distinguish it from the conditional form of the indicative. The tenses taken should be :—

Present.	Perfect—as I have written.
	Imperfect—I write.
Past.	Perfect—I had written.
	Imperfect—I wrote.
Future.	Perfect—I shall have written.
	Imperfect—I shall write.

Some grammarians recognise a "Progressive form," *e.g.* I am writing, I was writing, I shall be writing, but these come under the head of Imperfect.

Great care must also be taken to distinguish between participles and gerunds. The former partake of the qualities of the adjective and verb, the latter of the noun and verb.

(3) *Marmion.*—Prepare Canto II., stanzas 1–17. Read up the meanings of all allusions and references. Be prepared to analyse and parse any lines or words.

(4) Write an essay each week on one of the following subjects :—
(*a*) A sea voyage.
(*b*) Penny wise, pound foolish.
(*c*) Winter occupations and amusements.
(*d*) Punctuality.

Read up the subject if you do not know sufficient about it; an essay requires as much preparation as any other work. Make out a skeleton plan of what you propose to write. For example take (*b*).

(i.) This is a proverb—the wisdom of many the wit of one. (ii.) The literal interpretation—A man may save a penny and lose a pound. (iii.) The general interpretation—Economy may be misplaced; the purchase of a cheap article leads eventually to a greater outlay.

Send up an essay occasionally for criticism and assistance.

3. *History.*—The reigns of William I. and William II.
The chief points in the reign of William I. are :—
(1) The gradual conquest of England. Note that the Battle of Hastings was only the beginning. The west, the north, the east, rose in turn and were put down.
(2) The Feudal system. What it was: its advantages and disadvantages.
(3) Meanings of terms in connection with the Feudal system. Tenant in capite, villein, vassal, homage, fealty, investiture, feudal incidents (aids, reliefs, escheat, wardship, &c.).

(4) The changes produced by the Conquest :—
  (*a*) A new dynasty of kings.
  (*b*) A new nobility—the Saxons were nearly all dispossessed of lands.
  (*c*) New language, laws, manners, dress, amusements, &c.
  (*d*) Reform of the Church, and closer communion with the Continent.
(5) The Doomsday Book. Why and how compiled. The Curfew Bell and why instituted.
(6) William's personal character. His wife and children.

In William II. note :—
  (*a*) William's attempt upon his brother's dominions of Normandy.
  (*b*) Anselm and the Church.
  (*c*) The Crusades. What they were, why undertaken, how far successful, general results.

4. *Geography.*—Holland, Belgium, and Germany. Prepare these countries as indicated last month. Draw large outline maps, insert all names to be remembered, and repeat this until a fairly accurate map can be reproduced from memory. This is the only way to ultimate success, although it may entail some trouble at first. Note the following points carefully :—

Holland.—The hollow lands lying in many places below the level of the sea, the old delta of the Rhine, protected by huge dykes; a sandy soil suitable for agricultural and pastoral pursuits; a race of seamen of the same stock as ourselves. These are the keynotes to the geography of the country.

Belgium.—The northern part similar to Holland, the centre and south coal and iron field, "one great town."

Germany.—Learn the exact meaning of the term. It is a confederation of states, each governing itself for purely local affairs, but having a central government for imperial affairs.

In each case tabulate the industries, productions, the imports, exports; know the position of the chief towns, and for what they are famous. Be prepared to sketch and describe the course of the Rhine or Elbe.

To test your study see if you can answer all the questions in "Test Questions in Geography" (Holden).

5. *Arithmetic.*—Vulgar fractions. Learn exact definitions of all the terms employed. Be particularly careful with brackets and the rule of signs, *i.e.* always eliminate the signs of multiplication and division before doing any subtraction or addition. For example $3 \times 6 + 5 \times 2 - 3 - 6 \div 3$ must be considered as bracketed thus $(3 \times 6) + (5 \times 2) - 3 - (6 \div 3)$. This is most important in mixed fractions. Complex fractions must be worked perpendicularly and in sections horizontally, thus—

$$\frac{9\frac{1}{2} \div 6\frac{1}{2}}{9\frac{1}{2} - 6\frac{1}{2}} \div \frac{16\frac{1}{2} \div 11\frac{1}{2}}{16\frac{1}{2} + 11\frac{1}{2}} \times 17\frac{9}{14}$$

$$= \frac{\frac{19}{2} \div \frac{19}{3}}{\frac{19}{2} - \frac{19}{3}} \div \frac{\frac{135}{8} \div \frac{45}{4}}{\frac{135}{8} + \frac{45}{4}} \times \frac{247}{14}$$

$$= \frac{\frac{19}{2} \times \frac{3}{19}}{\frac{57 - 38}{6}} \div \frac{\frac{135}{8} \times \frac{4}{45}}{\frac{135 + 90}{8}} \times \frac{247}{14}$$

$$= \frac{\frac{3}{2}}{\frac{19}{6}} \div \frac{\frac{3}{2}}{\frac{225}{8}} \times \frac{247}{14}$$

$$= \frac{9}{19} \div \frac{12}{225} \times \frac{247}{14}$$

$$= \frac{9}{19} \div \frac{225}{12} \times \frac{247}{14}$$

$$= \frac{8775}{56} = 156\tfrac{3}{4}.$$

Such fractions must not be worked out in scattered pieces, or the result will most probably be incorrect.

Solutions of L.C.M. and G.C.M. asked for.

(1) Find the least weight which contains an exact number of pounds Troy or of pounds Avoirdupois. 1 lb. Troy = 5760 grains and 1 lb. Avoir. = 7000 grains. The answer will be the L.C.M. of these two numbers.

(2) What number divided by 24 leaves 21, by 36 leaves 33, by 48 leaves 45?

A little inspection will show that in each case the remainder is 3 less than the divisor, *i.e.* if the dividend were three more it would work out. Find the L.C.M. = 144 and deduct 3 = 141.

(3) The G.C.M. of two numbers is 119. Their L.C.M. is 11781, and one of the numbers is 1071. Find the other.

This can only be done by using the factors. The L.C.M. = $119 \times 11 \times 3 \times 3$. The one number is $119 \times 3 \times 3$. The L.C.M. contains the G.C.M. and each of the other factors in the two numbers.

One number is $119 \times 3 \times 3$.

The other must be 119×11.

(4.) The difference of two numbers is 117 and the L.C.M. is 1456. Find them.

$117 = 9 \times 13$; $1456 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 7 \cdot 13$.

The problem is to arrange the factors of 1456 in two sets with 9 times 13 more in one set than the other. The result is obvious. $2 \cdot 2 \cdot 2 \cdot 2 \times 13$ or 16×13, and 7×13.

Any difficulties experienced should be sent in for solution.

6. *Algebra.*—Chapter III., Hall and Knight.

7. *Geometry.*—Euclid: Book Propositions, 5–8. Practise working through the propositions, using different letters and with the figures in different Positions; *e.g.* in Proposition 2 the given point is generally a little above and to the right of the end of the line. See if you can work it with the point below and to the left, or over the middle of the line.

Practical.—Construction of parallels and angles.

8. *Music.*—The major and minor scales and their signatures.

9. *Science.*—The lever and centre of gravity. Note the three orders of levers and common examples of each. The centre of gravity found experimentally. Do this with various pieces of cardboard, &c. Work as many experiments as you can. A knife and a graduated ruler will supply the ordinary lever.

10. *Spelling.*—100 words weekly from "Words Commonly Misspelt."

11. *Penmanship.*—Write a page daily in the *Practical Teacher Copy Book*, and use great care at all times. A good style is easily acquired, and is always most useful.

Test Questions on Last Month's Work.

1. Write as a specimen of copy setting :—
  (*a*) Large hand—Bosphorus.
  (*b*) Small hand—

Beside yon straggling fence that skirts the way,
With blossomed furze unprofitably gay.

2. Analyse the following, and parse words in italics :—

Fain would I find the guide you want,
But ill may spare a pursuivant,
The *only* men that safe can ride
Mine *errands* on the Scottish side.
And *though* a bishop built this fort,
Few holy brethren here resort.

3. Give the masculine forms of marchioness, filly, heifer, doe, goose, lady, spinster, and the plurals of penny, cloth, die, brother, distinguishing their meaning.

4. What is case? Say what you can of the various objective cases.

5. Work the following :—

(1) What is the least number which leaves a remainder 4 when divided by 9, 99, 999, or 9999. Ans. 1,109,893.

(2) The population of a parish exceeds 3000 and is less than 4000. Whether the people be arranged in groups of 8, of 9, of 15, of 18, or of 25, 7 always remain over. Find the exact population. Ans. 3607.

(3) Five horses start together and continue running round a circular course, which is two miles in circumference. If they run respectively 18, 16, 15, 12, and 10 miles per hour, how soon will they be again together at the starting-point?

Ans. 2 hours from starting.

(4) Find the least number of ounces of standard gold that can be coined into an exact number of half-sovereigns, standard gold being coined at the rate of £3, 17s. 10½d. to the ounce.

Ans. 80 ounces.

6. Who were the Anglo-Saxons, whence came they, and in what parts of England did the various tribes settle? Give some account of their religion.

7. Why does Alfred deserve the title of "Great"?

8. How did the events of Edward the Confessor's reign prepare the way for the Conquest?

9. What are the chief industries of France? Name the towns that are connected with any of them.

(3) For what value of a are the roots of the equation $3x^2 + 4x + a = 0$ equal to one another. Ans. 3 or − 5.

(4) $\frac{x+3}{x+1} + \frac{x-6}{x-4} = \frac{x+4}{x+2} + \frac{x-5}{x-3}$. Ans. 1.

In working this sum it is useless to find the L.C.M. and free of fractions at first. Divide each denominator with each numerator and put down the result. Then the sum becomes—

$$\left(1 + \frac{2}{x+1}\right) + \left(1 - \frac{2}{x-4}\right) = \left(1 + \frac{2}{x+2}\right) + \left(1 - \frac{2}{x-3}\right).$$

The two 1's on each side cancel, so that

$$\frac{2}{x+1} - \frac{2}{x-4} = \frac{2}{x+2} - \frac{2}{x-3}.$$ Divide each side by 2.

$$\frac{1}{x+1} - \frac{1}{x-4} = \frac{1}{x+2} - \frac{1}{x-3}.$$

$$\frac{(x-4)-(x+1)}{(x+1)(x-4)} = \frac{x-3-(x+2)}{(x+2)(x-3)}, \text{ or}$$

$$\frac{-5}{(x+1)(x-4)} = \frac{-5}{(x+2)(x-3)}.$$ Divide by 5.

$$\frac{1}{(x+1)(x-4)} = \frac{1}{(x+2)(x-3)}, \text{ or}$$

$$(x+1)(x-4) = (x+2)(x-3)$$

$$x^2 - 3x - 4 = x^2 - x - 6$$

$$2x = 2$$

$$x = 1.$$

Women. Work any examples on the first four rules, and work the following paper :—

1. Simplify the expression—

$$2\left[x - 3\left\{x - 4\left(x - \frac{5}{6}\overline{x - a}\right)\right\}\right].$$

Also add—

$$(\overline{a-b}\,x - \overline{b-c}\,y) - (\overline{a+b}\,x + \overline{b+c}\,y) \text{ to } ax + cy + b(x+y).$$

Ans. $24a$; $(a-b)x - (b-c)y$.

2. If $a = 2$, find the numerical value of

$$a^{2a-1} + 2a^{a-2} + (2a-1)^a.$$ Ans. 21.

3. The product of two algebraical expressions is $4a^2b^2 + 2(3a^4 - 2b^4) - ab(5a^2 - 11b^2)$, and one of them is $3a^2 + 2ab - b^2$; find the other. Ans. $2a^2 - 3ab + 4b^2$.

4. Show that $\frac{x^6 - y^6}{x^3 - y^3} = (x-y)(x^2 - xy + y^2)$.

12. *Euclid.*—Book I., Props. 29–34, with 4 deductions each week.
Women.—Propositions 20 to 24, with 2 deductions each week.

13. *Science.*—Elementary properties of carbon, iron, mercury, water, carbon dioxide, and lime.

In each case arrange your notebook thus—

(1) Occurrence.—Does it occur free in nature, or in combination, or in both ways?

(2) Preparation.—How can it be formed chemically? Sketch any apparatus necessary in producing it.

(3) Properties.—Note each, and experiments which may be worked to show them.

(4) Chief compounds.

14. *Spelling.*—Learn 100 words per week from "Words Commonly Misspelt," Series C or D.

Test Questions.

1. Write as a specimen of copy-setting :—
   (*a*) Large Hand—Systematically.
   (*b*) Small Hand—
   To-night in Harfleur will we be your guest,
   To-morrow for the march are we addrest.
2. *English*—
   (1) Write out a classification of Adverbs, giving examples of each.
   (2) Compare the state of literature at the beginning with that at the end of the eighteenth century.
   (3) Analyse the following, and parse words in italics :—
   (*a*) And *let* him *say* to England that we send
   To know what willing ransom he will give.
   (*b*) The Dauphin, whom of succours we entreated
   Returns *us* that his powers are not yet *ready*
   To raise so great a siege.
   (4.) Discuss the structure and derivation of the following words :—inevitable, confederation, atheism, discontentment, regal, symphonious, annals, afield.
3. *Geography*—
   (1) Explain exactly what is meant by Dominion of Canada. How is it governed? and how does its government differ from that of Australia?
   (2) Describe a journey by the Canadian Pacific Railway from Ottawa to Vancouver.
   (3) Draw a sketch-map of the East Indies, and give a full description of one island.
   (4) A traveller proceeds overland from Calcutta to St. Petersburg. Explain which railways he would use, and the chief places passed.

PUPIL TEACHERS' COURSE

For Candidates' Examination, 1906.

Work to be Prepared.

1. *Reading and Repetition.*—Ten minutes' daily practice should be given to these subjects before a competent critic. The mere repetition of words is not enough; the spirit of the piece must be correctly interpreted.

2. *English.*—(1) Learn 10 roots and meanings each week.

(2) The grammar of the Verb. This must be very thoroughly done. A great deal depends upon learning good definitions. As it is very difficult to "make up" a correct definition, all students should copy into their note-books the definition in the text-book and commit it to memory. The definition of following terms must be known:—Verb: irregular, regular, transitive, intransitive; Voice: passive and active; Mood: indicative, infinitive, subjunctive, imperative; Tense; Participle; Gerund. If this is done properly many difficulties disappear. The subjunctive mood will require especial study, care being taken to distinguish it from the conditional form of the indicative. The tenses taken should be :—

Present.	Perfect—as I have written.
	Imperfect—I write.
Past.	Perfect—I had written.
	Imperfect—I wrote.
Future.	Perfect—I shall have written.
	Imperfect—I shall write.

Some grammarians recognise a "Progressive form," *e.g.* I am writing, I was writing, I shall be writing, but these come under the head of Imperfect.

Great care must also be taken to distinguish between participles and gerunds. The former partake of the qualities of the adjective and verb, the latter of the noun and verb.

(3) *Marmion.*—Prepare Canto II., stanzas 1–17. Read up the meanings of all allusions and references. Be prepared to analyse and parse any lines or words.

(4) Write an essay each week on one of the following subjects :—
   (*a*) A sea voyage.
   (*b*) Penny wise, pound foolish.
   (*c*) Winter occupations and amusements.
   (*d*) Punctuality.

Read up the subject if you do not know sufficient about it; an essay requires as much preparation as any other work. Make out a skeleton plan of what you propose to write. For example take (*b*).

(i.) This is a proverb—the wisdom of many the wit of one. (ii.) The literal interpretation—A man may save a penny and lose a pound. (iii.) The general interpretation—Economy may be misplaced; the purchase of a cheap article leads eventually to a greater outlay.

Send up an essay occasionally for criticism and assistance.

3. *History.*—The reigns of William I. and William II.

The chief points in the reign of William I. are :—
   (1) The gradual conquest of England. Note that the Battle of Hastings was only the beginning. The west, the north, the east, rose in turn and were put down.
   (2) The Feudal system. What it was: its advantages and disadvantages.
   (3) Meanings of terms in connection with the Feudal system. Tenant in capite, villein, vassal, homage, fealty, investiture, feudal incidents (aids, reliefs, escheat, wardship, &c.).

(4) The changes produced by the Conquest :—
(*a*) A new dynasty of kings.
(*b*) A new nobility—the Saxons were nearly all dispossessed of lands.
(*c*) New language, laws, manners, dress, amusements, &c.
(*d*) Reform of the Church, and closer communion with the Continent.
(5) The Doomsday Book. Why and how compiled. The Curfew Bell and why instituted.
(6) William's personal character. His wife and children.

In William II. note :—
(*a*) William's attempt upon his brother's dominions of Normandy.
(*b*) Anselm and the Church.
(*c*) The Crusades. What they were, why undertaken, how far successful, general results.

4. *Geography.*—Holland, Belgium, and Germany. Prepare these countries as indicated last month. Draw large outline maps, insert all names to be remembered, and repeat this until a fairly accurate map can be reproduced from memory. This is the only way to ultimate success, although it may entail some trouble at first. Note the following points carefully :—

Holland.—The hollow lands lying in many places below the level of the sea, the old delta of the Rhine, protected by huge dykes; a sandy soil suitable for agricultural and pastoral pursuits; a race of seamen of the same stock as ourselves. These are the keynotes to the geography of the country.

Belgium.—The northern part similar to Holland, the centre and south coal and iron field, "one great town."

Germany.—Learn the exact meaning of the term. It is a confederation of states, each governing itself for purely local affairs, but having a central government for imperial affairs.

In each case tabulate the industries, productions, the imports, exports; know the position of the chief towns, and for what they are famous. Be prepared to sketch and describe the course of the Rhine or Elbe.

To test your study see if you can answer all the questions in "Test Questions in Geography" (Holden).

5. *Arithmetic.*—Vulgar fractions. Learn exact definitions of all the terms employed. Be particularly careful with brackets and the rule of signs, *i.e.* always eliminate the signs of multiplication and division before doing any subtraction or addition. For example $3 \times 6 + 5 \times 2 - 3 - 6 \div 3$ must be considered as bracketed thus $(3 \times 6) + (5 \times 2) - 3 - (6 \div 3)$. This is most important in mixed fractions. Complex fractions must be worked perpendicularly and in sections horizontally, thus—

$$\frac{9\frac{1}{2} \div 6\frac{1}{2}}{9\frac{1}{2} - 6\frac{1}{2}} \div \frac{16\frac{1}{2} \div 11\frac{1}{4}}{16\frac{1}{2} + 11\frac{1}{4}} \times 17\tfrac{9}{14}$$

$$= \frac{\frac{19}{2} \div \frac{19}{3}}{\frac{19}{2} - \frac{19}{3}} \div \frac{\frac{135}{8} \div \frac{45}{4}}{\frac{135}{8} + \frac{45}{4}} \times \frac{247}{14}$$

$$= \frac{\frac{19}{2} \times \frac{3}{19}}{\frac{57 - 38}{6}} \div \frac{\frac{135}{8} \times \frac{4}{45}}{\frac{135 + 90}{8}} \times \frac{247}{14}$$

$$= \frac{\frac{3}{2}}{\frac{19}{6}} \div \frac{\frac{3}{2}}{\frac{225}{8}} \times \frac{247}{14}$$

$$= \frac{9}{19} \div \frac{12}{225} \times \frac{247}{14}$$

$$= \frac{9}{19} \div \frac{225}{12} \times \frac{247}{14}$$

$$= \frac{8775}{56} = 156\tfrac{3}{4}\tfrac{9}{6}.$$

Such fractions must not be worked out in scattered pieces, or the result will most probably be incorrect.

Solutions of L.C.M. and G.C.M. asked for.

(1) Find the least weight which contains an exact number of pounds Troy or of pounds Avoirdupois. 1 lb. Troy = 5760 grains and 1 lb. Avoir. = 7000 grains. The answer will be the L.C.M. of these two numbers.

(2) What number divided by 24 leaves 21, by 36 leaves 33, by 48 leaves 45?

A little inspection will show that in each case the remainder is 3 less than the divisor, *i.e.* if the dividend were three more it would work out. Find the L.C.M. = 144 and deduct 3 = 141.

(3) The G.C.M. of two numbers is 119. Their L.C.M. is 11781, and one of the numbers is 1071. Find the other.

This can only be done by using the factors. The L.C.M. = $119 \times 11 \times 3 \times 3$. The one number is $119 \times 3 \times 3$. The L.C.M. contains the G.C.M. and each of the other factors in the two numbers.

One number is $119 \times 3 \times 3$.

The other must be 119×11.

(4.) The difference of two numbers is 117 and the L.C.M. is 1456. Find them.

$117 = 9 \times 13$; $1456 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 7 \cdot 13$.

The problem is to arrange the factors of 1456 in two sets with 9 times 13 more in one set than the other. The result is obvious. $2 \cdot 2 \cdot 2 \cdot 2 \times 13$ or 16×13, and 7×13.

Any difficulties experienced should be sent in for solution.

6. *Algebra.*—Chapter III., Hall and Knight.

7. *Geometry.*—Euclid: Book Propositions, 5–8. Practise working through the propositions, using different letters and with the figures in different Positions; *e.g.* in Proposition 2 the given point is generally a little above and to the right of the end of the line. See if you can work it with the point below and to the left, or over the middle of the line.

Practical.—Construction of parallels and angles.

8. *Music.*—The major and minor scales and their signatures.

9. *Science.*—The lever and centre of gravity. Note the three orders of levers and common examples of each. The centre of gravity found experimentally. Do this with various pieces of cardboard, &c. Work as many experiments as you can. A knife and a graduated ruler will supply the ordinary lever.

10. *Spelling.*—100 words weekly from "Words Commonly Misspelt."

11. *Penmanship.*—Write a page daily in the *Practical Teacher Copy Book*, and use great care at all times. A good style is easily acquired, and is always most useful.

Test Questions on Last Month's Work.

1. Write as a specimen of copy setting :—
(*a*) Large hand—Bosphorus.
(*b*) Small hand—

Beside yon straggling fence that skirts the way,
With blossomed furze unprofitably gay.

2. Analyse the following, and parse words in italics :—

Fain would I find the guide you want,
But ill may spare a pursuivant,
The *only* men that safe can ride
Mine *errands* on the Scottish side.
And *though* a bishop built this fort,
Few holy brethren here resort.

3. Give the masculine forms of marchioness, filly, heifer, doe, goose, lady, spinster, and the plurals of penny, cloth, die, brother, distinguishing their meaning.

4. What is case? Say what you can of the various objective cases.

5. Work the following :—

(1) What is the least number which leaves a remainder 4 when divided by 9, 99, 999, or 9999. Ans. 1,109,893.

(2) The population of a parish exceeds 3000 and is less than 4000. Whether the people be arranged in groups of 8, of 9, of 15, of 18, or of 25, 7 always remain over. Find the exact population. Ans. 3607.

(3) Five horses start together and continue running round a circular course, which is two miles in circumference. If they run respectively 18, 16, 15, 12, and 10 miles per hour, how soon will they be again together at the starting-point?

Ans. 2 hours from starting.

(4) Find the least number of ounces of standard gold that can be coined into an exact number of half-sovereigns, standard gold being coined at the rate of £3, 17s. 10½d. to the ounce.

Ans. 80 ounces.

6. Who were the Anglo-Saxons, whence came they, and in what parts of England did the various tribes settle? Give some account of their religion.

7. Why does Alfred deserve the title of "Great"?

8. How did the events of Edward the Confessor's reign prepare the way for the Conquest?

9. What are the chief industries of France? Name the towns that are connected with any of them.

10. Draw a sketch map of the Iberian Peninsula, and mark in the physical features and the following towns, Madrid, Corunna, Bilbao, Granada, Valencia, Barcelona, Cadiz, Saragossa.

11. Describe a visit to Paris, mentioning the chief objects of interest one would see.

12. Re-write the following, doubling the value of each note and rest:—

OUR CERTIFICATE COURSE FOR 1906.

BY GEORGE COLLAR, B.A., B.SC.,
Head-Master of Stockwell Pupil-Teacher School.

In a few days after these lines are in our readers' hands the 1905 Certificate Examination will take place, and we have every confidence that those who have followed our course conscientiously will be able to attack the papers without trepidation, and we hope with success.

We now begin to deal with the work for next year's examination, and advise all who intend to sit to throw themselves with energy into the work. We would also ask all our readers to bring the course under the notice of any intending candidates they may know, as it is an essential to success that the course should be followed in its entirety, and the work evenly distributed over the time.

Full regulations and syllabuses may be obtained on application to the Secretary, Board of Education, Whitehall, London, S.W., and we should like to call the special attention of our readers to the following points.

The names of candidates must be sent in before May 1, 1906, by the correspondents of the schools in which they are respectively engaged, and a candidate not employed in an inspected Elementary School or approved Pupil-teacher Centre must, as a rule, produce a satisfactory recommendation from the managers of the last school in which he or she was employed.

A candidate must not be less than twenty years of age on October 1, 1906, and must have served at least one year in an inspected Elementary School or approved Pupil-teacher Centre, and must have passed the King's Scholarship Examination, or its equivalent, not later than October 1, 1904, except in the case of University graduates.

A candidate must, while employed as an uncertificated teacher, have obtained a favourable report from an Inspector for skill in Reading and Practical Teaching. As a rule this report must be obtained during the twelve months preceding the Certificate Examination.

Candidates who wish to be examined in Drawing, Section D, must apply to the Board of Education, South Kensington, before March 1st in the case of Blackboard Drawing, and before March 18th in the case of other subjects of Drawing.

The subjects marked A to I in the syllabus are compulsory, J and K are optional. All candidates who satisfy the examiners in Section A, and obtain a satisfactory aggregate of marks in Sections B to I, will be considered to have passed the examination, and their names will be arranged in alphabetical order—*not in classes.* Appropriate marks will be placed in the list against the names of candidates who pass with credit in Sections B, C, F, G, H, I, J, K, and also against the names of those who may give proof of steady work, and of a certain degree of successful study in Sections J and K. No mark will be placed against the names of candidates who pass with credit in Section D, but candidates who acquit themselves satisfactorily in any of the Drawing subjects will receive the South Kensington Certificate.

Syllabus and Text-Books.

There is now no separate paper in either spelling or handwriting, but "defective Spelling or Handwriting may be taken into account in estimating the value of a candidate's work." Candidates are advised to cultivate a bold legible hand, and if necessary to take daily practice in copy-book writing: the "semi-upright" style is the one recommended. Should any candidates be weak in spelling they must pay systematic attention to the matter or they will be penalised in every paper they write.

Section A.: Reading.—To read aloud with ease and clear enunciation. Candidates will be expected to read passages from the books prescribed for general reading under Section F. An Inspector of the Board will hear each candidate read from these books, and also at his discretion from any book he may bring or choose. The Inspector may also ask questions in order to ascertain whether the approved books have been read intelligently. Great importance must be attached to this, as failure in reading will exclude a candidate from the rest of the examination. Do not be too self-satisfied, but practise reading aloud before a competent critic.

Practical Teaching.—To teach a class in the presence of the Inspector.

Section B.: The Principles of Education.—(1) The aims of school training, especially in relation to primary schools; physical, mental, and moral training; the school in relation to the home and the community.

(2) School organisation, types of schools, school premises, staffing, school records, school discipline.

(3) Courses of instruction, principles and methods of teaching the subjects usually included in the primary school course.

(4) School hygiene, sanitary conditions of premises, school work in relation to health, common ailments and defects of children and their treatment in school.

(5) One of the following:—

(*a*) Educational ideas of Froebel and Pestalozzi.

(*b*) "Education," by Herbert Spencer.

(*c*) "Thomas and Matthew Arnold," by J. G. Fitch (Great Educator Series), together with Chapters III. and IV. in Stanley's "Life of Arnold."

The teacher should endeavour to read as widely as possible, as this is especially the subject which is to prepare him for his life's work. As a text-book he should use *School Management*, by Collar and Crook (Macmillan & Co.); this will be found to cover the greater part of the syllabus, and should be thoroughly known. We went very fully into the question of School Hygiene in our *Certificate Course for* 1905, and students who have not the last twelve numbers of the *Practical Teacher* by them should obtain them and study the articles. Newsholme's *School Hygiene* (Swan Sonnenschein) is a useful book on the subject, so is Carpenter's *Certificate School Hygiene* (W. B. Clive). With regard to mental and moral training the student should read Welton's *Logical Bases of Education* (Macmillan), or Cartwright's *Mental Science* (Nelson) and MacCunn's *Making of Character* (Cambridge Press). In section 5 we propose to take up subdivision (*a*) and leave the others, as only one is needed, and we should recommend the student to get Herford's *Froebel*, Vol. I. (Isbister), and to read the articles on Froebel and Pestalozzi in Quick's *Educational Reformers.*

Section C.: Theory and Practice of Music.—An elementary knowledge of both notations is required, and as we have not much space at our disposal we shall be obliged to leave our readers to work at this for themselves, and recommend Bertenshaw's *Elements of Music* (Longmans) and Rodger's *Theory of Music* (Curwen). These should be supplemented by Hardy's *How to Train Children's Voices* (Curwen).

Section D.: Drawing.—For Blackboard Drawing the student should procure Steeley's *Nature Drawing and Design Cards* (Bacon & Co.), and practise at odd intervals. If possible, he should join a class and take either "Drawing in Light and Shade from a Cast," "Geometrical Drawing," or "Perspective." Geometrical drawing may be studied at home by a fairly intelligent student, but it is hardly advisable to attempt the others without guidance.

Section E.: Needlework (for women only).—One of the following will be set: (*a*) A test in practical Needlework or Knitting. The exercise will be based on the Needlework and Knitting usually required from children in a Public Elementary School, and will include the stitches used in making and repairing simple garments.

Or (*b*) An exercise in cutting out and fixing together the various parts of a garment.

As this is a practical subject, we cannot offer to give help in our columns.

Section F.: English Language, Literature, and Composition.

1. Paraphrase of an unseen passage of English prose or verse.

2. For exact and detailed study—Milton: "Paradise Lost," Bk. VI.; "Lycidas," "Areopagitica," and the "Sonnets."

3. For general reading—"The Golden Treasury of Songs and Lyrics," Bk. II.; Scott: "Woodstock," "Fortunes of Nigel;" "Pepys Diary" (shortened edition); "Memoirs of Colonel Hutcheson by his Wife."

CLOUGH'S CORRESPONDENCE COLLEGE,

The Oldest and Most Successful Correspondence College

Temple Chambers, London, E.C.

Remarkable Successes of Clough's Students.

SCHOLARSHIP.

At the King's Scholarship Examination, December 1904, no less than **FIVE** Students of Clough's Scholarship Class were placed in

DIVISION I. of the FIRST CLASS,

viz., **Miss B. L. MAJOR, Mr. L. COUCH, Mr. A. DAVISON, Mr. C. J. MOGFORD,** and **Mr. H. SLOMAN.**

This is the **Third Year in succession** that Students of Clough's Scholarship Class have been placed in **Division I. of the First Class,** this distinguished position being taken last year, when only two men in all England were placed in the First Division of the First Class, by **Mr. READER W. BULLARD,** and in the previous year by **Mr. G. S. BLAKE.**

Besides the remarkable successes of the past three years the following distinguished positions on the Scholarship List have been taken by Clough's Pupils:—Nos. **1, 2** (three times), **3, 4, 6** (four times), **7** (twice), **8, 9** (twice), **10** (three times), and many others in the First Hundred.

CERTIFICATE.

99 Students of Clough's Certificate Class for July 1903 were placed in the **FIRST CLASS,** but even this Remarkable List of Successes was eclipsed by the 1904 results, for no less than **110** Students of Clough's Certificate Class for **July 1904** were placed in the **FIRST CLASS.**

*** **The test of efficiency is success, and these results prove the excellence of the tuition provided in this Class. No other Correspondence Class can show such a record of success.**

For Prospectus, Syllabus, Entry Form, and full particulars of any Class, write to—

THE SECRETARY,

Clough's Correspondence College,

Temple Chambers, London, E.C.

4. English Composition.

The first and last of the above sections require a very systematic study of the principles of composition, and the student should take as his text-book either Meiklejohn's *Art of Writing English*, or Nesfield's *Senior Course of English Composition*.

There are many editions of Milton's works, and any student who is not in possession of the complete poetical works should get the Globe Edition (Macmillan) with Professor Masson's valuable introduction; as text-books for the study of the parts set, we can recommend *Helps to the Study of Milton's Areopagitica and the English Sonnets*, by C. W. Crook (Ralph, Holland & Co). Cotterill's edition is also a good one, and so are the editions of *Lycidas* and *Paradise Lost, Bk. VI.*, by Cotterill (Macmillan).

The *Golden Treasury* is published by Macmillan & Co., and the student can obtain the complete collection for half-a-crown, or can get Book II. annotated.

We advise our readers to get Nelson's *Century Edition* of the two novels by Sir Walter Scott, and later on we shall be prepared to recommend editions of the other two works.

SECTION G.: HISTORY AND GEOGRAPHY.

1. Outline of the History of England.
2. Detailed study of the History of England from 1603 to 1688.
3. The Geography of Europe and North America.

It is always difficult to know what is meant by "Outline," but we should recommend the use of Gardiner and of the Atlas published as a companion to it (Longmans). There are many books that deal with the special period, and we shall give advice as to the portions of them to study when we take up the period.

Meiklejohn's or Longmans' Geographies should be used as text-books, supplemented by any books on the special countries.

SECTION H.: ARITHMETIC AND ELEMENTARY MATHEMATICS.—In order to test the readiness and facility of the candidates, longer papers will be set than heretofore. The candidates will not be limited to any particular number of questions; but, as they will not be expected to answer all the questions proposed, small portions of the syllabus may be omitted without loss.

In assigning marks, style and method will be considered. All candidates must be examined in Arithmetic; and all men must be examined in Algebra and Geometry; women who wish to obtain a pass, with credit, in Section H, must be examined in Algebra, Part I., and in Part I. either of Euclid or of the alternative course. Women cannot be examined in Algebra, Part II., or in Part II. of either course of Geometry.

Christian and Collar's *New Arithmetic, Theoretical and Practical*, will be found the most useful text-book in Arithmetic, as it lays special stress on *style, methods*, and *illustrations for use in teaching*.

We should strongly advise all our lady readers to attempt the Algebra and Geometry, as they will benefit greatly by the training, and the knowledge of elementary Algebra will be of great use in dealing with questions in Arithmetic. Hall and Knight's *Elementary Algebra* is about the best; and Hall and Stevens' *Euclid I.–IV.* and *VI.* should be used by those who decide on Euclid, while those who prefer the alternative course should use either Hall and Stevens' *School Geometry I.–IV.*, or Christian and Pratt's *Modern Geometry* (Allman). The course for women will only go as far as quadratics with one unknown in Algebra, and the first two books of Euclid, or their substance, in Geometry.

SECTION I.: GENERAL ELEMENTARY SCIENCE.—The syllabus has been recast, and consists now of two parts—Part I., the elements of Physiography, *i.e.* physics, chemistry, and astronomical and physical geography; and Part II., Biology, and Hygiene. It is not expected that candidates will cover the whole syllabus, but something should be attempted in each part: candidates should pay special attention to those parts of the Syllabus which they have local facilities for studying.

SECTION J. AND K.—The student may take one or two ancient or modern languages from the following list: Latin, Greek, Hebrew, French, German, Spanish, Italian, Welsh. A sound knowledge of grammar and syntax will be required. There are no set books prescribed for study, but passages of moderate difficulty from standard authors will be given for translation into English, and candidates will also have to translate passages of English prose into the language. All candidates who have an opportunity for studying one or more languages should try the language papers. The most popular ones are Latin and French.

SYLLABUS AND NOTES FOR JULY: ENGLISH COMPOSITION.—Study Nesfield's *Senior Composition*, chapters i., ii., and viii., and work the exercises on them, or the *Art of Writing English*, chapters i. and ii.

Prepare essays on the following subjects:—

1. Mountain passes.
2. Trades unions.
3. The life and character of the Duke of Wellington.
4. Methods of study.
5. British forest trees.

THEORY OF TEACHING.

Study the first four chapters of the text-book. The definitions of education, instruction, and teaching are many and various, but we should advise our readers to keep one or two in mind. Pestalozzi says, "It is the chief business of education to pass from distinctly perceived individual notions to clear general notions." Froebel says, "The essence of education consists in this, that each department of human activity is developed in the individual, none of them in an isolated manner, but each in a harmonious relation to the others." Turning to the ancient Greek philosophers, we find that Plato says, "In education there is a union of watchfulness over the progress of training, and a course of discipline for intellectual and bodily development"; and Aristotle says, "The general problem of education is to develop the children from imperfect beings into perfect beings. The better part of man is the Reason, which must therefore be the chief object of education." This same idea is expressed, perhaps rather more tersely, by Kant, who says, "The object of education ought to be to develop in the individual all the perfection of which he is capable." Herbart regards education as an extension of morality, and he says, "Morality is universally acknowledged as the *highest* aim of humanity, and consequently of education. . . . But to set up morality as the whole aim of humanity and education, an expansion of the concept of morality is required." Sir J. G. Fitch says, "Teaching is both an art and a science. It aims at the accomplishment of a piece of work, and is therefore an art. It seeks to find out a natural basis for such rules as it employs, and is therefore a science."

Two different views may be taken of the nature of the materials the teacher has to work on—one attaching the chief importance to a knowledge of the subject-matter, and assuming that if a teacher is well up in his subject he will of necessity be a good teacher; while the other attaches too much importance to the innate power of the child to shape its own course. According to one view the child is a sort of germ, which grows spontaneously, and seizes on all kinds of suitable material within its reach and assimilates it; while according to the other, his mind must be built up like a wall by added material. Neither view is absolutely correct, but the correct one is got by taking the truth out of both. The child has inborn tendencies which regulate the manner in which he must learn, and a knowledge of these tendencies is essential for every teacher; but he must, moreover, be well acquainted with his subject, and know how to prepare it so as to make it possible for the child to assimilate the knowledge.

ENGLISH LANGUAGE AND LITERATURE.

There is always something unsatisfactory in having one book of a great work set for detailed study, that is, that it is often taken in hand without a general knowledge of the whole. We are afraid that many of our readers are not free from the standing reproach of their fellow-subjects, that they have never read the greatest of English epic poems. We strongly advise them to read through the whole in order to appreciate the general bearing of the poem, and the relation of the Sixth Book to the others.

An epic poem is universally regarded as the noblest of all forms of poetry. In the "Poetics," Aristotle set down the rules for epic poetry, and the writers of epic poems ever since have kept them. These rules may be summed up as follows: The subject of an epic poem must be some one, great, complex action. The principal personages must be great and powerful, and hold the highest places in the classes to which they belong. They must be dignified and elevated in their ideas. The measure of the poem must be stately, and of a sonorous dignity befitting the subject. The action must be sufficiently rapid, and its details developed by a mixture of narration, description, dialogue, and soliloquy.

The poem received scanty appreciation in the author's lifetime, and for a long while after. In his life of Milton, Dr. Johnson passes some severe criticisms on the poem, although he points out some fine features. It owed much of its introduction to popular notice to the criticisms of Addison in the *Spectator*. He compares Milton's poem with the two great epics of antiquity—Homer's *Iliad* and Virgil's *Æneid*, and both in the choice of subject and the manner in which it is treated he considers *Paradise Lost* superior. Both Coleridge and Hallam regard Milton's work as superior to Dante's *Divina Commedia*.

With regard to subject the *Paradise Lost* is not merely national, appealing to the people of one country, but it is of interest to the whole human race, or at least to Christendom.

FAMOUS
SHILLING GUIDE-BOOKS

CLOTH BOUND, ROUND CORNERS.

Superbly Illustrated. Furnished with excellent Maps and Plans.
Printed in clear Type, on good Paper.

*** *Full Prospectus and particulars post free on application.*

ENGLAND AND WALES

Aldeburgh
Bath
Bexhill
Bideford
Blackpool
Bournemouth
Bridlington & Filey
Brighton and Hove
Broadstairs
Buxton
Canterbury
Channel Islands
Cleveland, Portishead, &c.
Clifton, Bristol
Cromer
Dartmoor
Dawlish
Deal
Dover
Eastbourne
English Lake District
Exeter
Exmouth
Falmouth
Felixstowe
Folkestone
Harrogate
Hastings
Herne Bay
Ilfracombe
Ilkley
Isle of Man
Isle of Wight
Leamington
Liverpool
Llandrindod Wells
London
Lowestoft
Lyme Regis
Lynton and Lynmouth
Lytham
Margate
Matlock
Minehead
Newquay

Shanklin Old Village

North Wales (Northern Section)
North Wales (Southern Section)
Penzance
Plymouth
Portsmouth
Ramsgate
Scarborough
Sherwood Forest
Sidmouth
Skegness
Southsea
Southwold
Stratford-upon-Avon
Sutton-on-Sea
Swanage
Teignmouth
Torquay
Weston-super-Mare
Weymouth
Whitby
Woodhall Spa
Wye Valley
Yarmouth and The Broads

SCOTLAND

Aberdeen
Edinburgh
Glasgow
Inverness
Highlands and Islands
Oban

IRELAND

Antrim
Belfast
Cork
Donegal Highlands
Dublin
Greenore
Killarney
Northern Lake District
Limerick
Waterford

THE CONTINENT

Paris
Switzerland
Belgium and the Ardennes
Holland

WARD, LOCK & CO., Limited, Salisbury Square, LONDON, E.C.

There is a remarkable unity in the poem, from the first line, which speaks

"Of man's first disobedience,"

right to the last, which tells us how in punishment

"They, hand-in-hand, with wandering steps and slow,
Through Eden took their solitary way."

The sin of disobedience is the theme, with which all the parts are thrown into intimate connection.

As the materials were slender, Milton had to draw on the Book of Revelation for subject-matter, which he worked up in the form of episodes. In this matter he has shown great art by the skilful way in which he has woven them into the grand theme.

The characters of the poem are all elevated, not only the Almighty, and the glorious hierarchy of heaven, but Lucifer "in shape and gesture proudly eminent," and Adam and Eve symbolise all that is grandest in their classes.

The language is dignified and the metre majestic, although the former is frequently marred by Latin forms and idioms that do not well fit the genius of the English language.

During the month the life of Milton should be prepared, and the whole of *Paradise Lost* read through. A few notes should be taken to help to remember the course of the action and the contents of each book.

English History.

Revise the outline of English History to the accession of Henry III. Note particularly the manners and customs of each period, and especially such as can be regarded as the source or origin of those of our own day.

Geography.

Study the general physical geography of Europe.

Arithmetic.

Do not despise this subject because you think you have gone all through it before. Remember that you can gain special credit by the use of special methods. In fact, questions are frequently set in the Certificate Examination which entail practically no work if you deal with them by the best methods, but which involve very long calculations if you follow the usual rules. Read very carefully through the first sixteen chapters in the Arithmetic Book, and notice the special methods in the following paragraphs: 19-23, 39, 40, 46 (with special reference to the final remainder), 48-50, 58 (First Method), 64, and 70.

The syllabus says that questions will not be set which involve Troy Weight, Apothecaries' Weight, True Discount, Cube Root, Foreign Exchange, and Scales of Notation. Questions on Stocks will not involve a knowledge of "Brokerage." In the past it is probable that the questions discovered an ignorance of the practice of brokerage among those who answered them; they frequently showed such ignorance on the part of those who set them. Hence "brokerage" can well be spared. Candidates must be acquainted with the principles of the Metric System, and it is devoutly to be wished that the system will soon take its place in the commercial calculations of this country.

Algebra.

The syllabus in Arithmetic states that "Algebraical symbols and processes will be permitted." In fact it is practically impossible to draw a hard and fast line between Algebra and Arithmetic. The former has been called "generalised arithmetic," and hence any one who wishes to understand the principles of Arithmetic must know how to generalise, and to express his rules and results in general terms.

The first thing then to realise in the study of Algebra is that it is simply Arithmetic with the restrictions removed. Among the limitations that can be removed are:—

(1) *The fixed value of the symbols employed.*—In Arithmetic, except in so far as it is affected by its place, a symbol, such as 5, has a value which is absolutely fixed. But in Algebra, a symbol, such as a, may denote any number we wish; hence it is useful in two ways:—

(a) It may denote a whole series of numbers that have some common relation.

(b) It may be used provisionally to denote a number the value of which is unknown.

(2) *The use of 0 as the lowest number we can employ.*—Just as in speaking of temperature we can have so many degrees below zero, so in Algebra we can deal with numbers which are lower than 0.

From the first of these facts we are able to express rules and results very briefly. Thus, instead of saying, "The value of a product is not changed by altering the order of the factors," we simply write

$$ab = ba.$$

So instead of saying, "The square of the sum of two numbers is the square of each number increased by twice the product of the two numbers," we need simply write

$$(a+b)^2 = a^2 + 2ab + b^2.$$

Go to the end of Chap. IV. in Hall and Knight, including the Miscellaneous Exercises.

Geometry.

Those who follow Euclid's course should go to the end of Prop. VIII. if they are taking it for the first time. Men should revise to the end of XXVI.

Those who follow Hall and Stevens' *School Geometry* should go to the end of page 50; in Christian and Pratt the work should go to the end of page 42.

General Elementary Science.

There is a great deal to do in order to cover the syllabus at all effectively. It must be done as far as possible practically. We will follow the syllabus as far as we can in order, but it will be advisable to begin the second part before the first is finished.

The student should obtain a rule divided into millimetres, and make some practical measurements. Measure the length and width of sheets of paper, and various objects, both in inches and in centimetres, and then reduce one expression to the other by taking

$$1 \text{ metre} = 39{\cdot}3704 \text{ inches}.$$

In this way one measurement will check the other, and the two measurements check the calculation.

If the student has the use of a fairly delicate balance he can check the rules for finding the area of simple figures by the measurement of their sides.

In measuring a body with a curved surface it is advisable to set it between two perpendiculars, *e.g.* a cylinder may be placed between two set squares and the space between their feet taken.

Measure the diameter of a circular disc. Next make a mark on its circumference, and mark on the bench or table the point at which this mark touches, then roll the disc completely round, and mark the spot at which the mark again touches the table, then measure the distance between the two marks on the table. When this is divided by the diameter the quotient should be 3·1416.

Carefully cut out a square inch of thin cardboard and weigh it. Then take rectangular sheets of the same material and measure their length and breadth in inches. The product of these two numbers will be the number of square inches in their area. If the weight of each rectangle be divided by the weight of the square inch, the quotient should be the same as the number of square inches in each rectangle.

By a similar method it will be found that the area of a triangle is given by the formula

$$A = \tfrac{1}{2}H \times B,$$

where H is the height and B the base.

Prepare the section on Forms of Matter.

SUMMER COURSE OF THE FROEBEL SOCIETY.

THIS Society has arranged a vacation course of lectures and demonstrations to be held between July 31st and August 12th. Nature study seems to be the chief feature taken up, and some very prominent lecturers, such as Professor Earl Barnes and Professor Findlay, have promised their assistance. No doubt many of our readers may feel tempted to sacrifice a portion of their well-earned holiday to attend the course. They will be able to obtain full prospectus and particulars from Miss M. E. Findlay, 36 West Side, Wandsworth Common, London, S.W.

Mr. Yoxall's novel, *Alain Tanger's Wife*, has now appeared in a sixpenny edition.

Blackie's List

Just Published

NEW DRAWING CHARTS

BLACKIE'S

A COMPLETE COURSE OF FREE-ARM AND INDUSTRIAL DRAWING: A Series of Charts for the Blackboard in Coloured Crayon on a Dark Ground. A full explanatory text is provided, in which the sequence and purpose of every step is made clear and the method explained. The work follows in the main the syllabuses of the Board of Education, and is designed to enable teachers to translate drawing schemes into practical lessons, each in its assigned place. For Schools of all Grades, from Kindergarten to School of Art. By J. W. TOPHAM VINALL, A.R.C.A. (Lond.), Art Specialist to the Education Committee of the London County Council. In portfolio, price 12s. 6d. net.

NATURE STUDY

BLACKIE'S

An admirable course of lessons in this interesting subject will be found in Blackie's "Newton Nature Readers." The lessons are simple and free from technical language, and the elementary truths of natural and physical science are presented in a new and attractive manner. There is an Infants' Reader, and there are six books for the Standards.

For the Teacher, Prof. Scott Elliott's "Nature Studies" (Plant Life, 3s. 6d.) will well repay perusal. A recent review concludes with the happy expression, "It seems to give me new eyes."

*** *Full particulars of the Readers and Teachers' Handbook may be had on application.*

"B" ARITHMETIC

BLACKIE'S

Teachers taking up Scheme B will find all their requirements met by Messrs. Blackie's three series of "B" Arithmetics, "B" Tests, and "B" Problems.

The Teacher says: "A thoroughly good series, and one which will be welcomed by all teachers on the look-out for exercises expressed in varied and unstereotyped forms. For large classes they should prove a real help. The careful graduation throughout deserves a special word of praise."

*** Messrs. Blackie & Son are just publishing a New Series of Three Term Script Figure Arithmetics for Scheme B. No. I. is now ready, and the remaining numbers will be issued immediately.

Hygiene, Physiology, Temperance

HYGIENE, &c.

BLACKIE'S

The Medical Profession and many leading Educationists are now recommending that a course of lessons embracing Hygiene, Physiology, and Temperance be given in the Senior Departments in Elementary Schools. The Course recommended is covered in an exceptionally interesting and attractive way by Blackie's "Lessons on Living" (1s. 6d.), a reading book for Standards V., VI., VII. The information is given in bright narrative form, and in a series of simple and intere-ting talks such subjects as the "framework" and the "covering" of the b dy, the heart and the circulation, digestion and food, breathing and the air, the brain and the nervous system, are dealt with, and the laws of health set forth in a way likely to imprint them on the memory. The book is proving exceedingly popular in schools, and will be found of great use wherever the subject of Hygiene, &c., is taken up. A corresponding Handbook for Teachers is published, price 6d.

BOOK-KEEPING

BLACKIE'S

Teachers of Book-keeping will be gratified to know that a Key has been issued to Mr. W. Grierson's "Practical Book-keeping for Commercial Classes." This important textbook attained a wide popularity during the last session, and won golden opinions from teachers, examiners, and the educational Press. Any E.C.S. Headmaster who does not already know the book should make a point of examining a copy. The published price of the Text-book is 1s. 6d., and of the Key, 3s. 6d., net.

BLACKIE & SON, Limited
50 OLD BAILEY, LONDON, E.C.

BELL'S CATHEDRAL SERIES.

Any one requiring these well-known Guides should be sure and get BELL'S.

Profusely Illustrated. Cloth, crown 8vo, 1s. 6d. net each.

NOW READY.

ENGLISH CATHEDRALS. An Itinerary and Description.
BRISTOL.
CANTERBURY. 5th Edition.
CARLISLE.
CHESTER. 2nd Edition, revised.
CHICHESTER.
DURHAM. 2nd Edition.
ELY. 2nd Edition.
EXETER. 2nd Edition.
GLOUCESTER. 2nd Edition.
HEREFORD. 2nd Edition, revised.
LICHFIELD. 2nd Edition, revised.
LINCOLN. 3rd Edition, revised.
MANCHESTER.
NORWICH. 2nd Edition.
OXFORD. 2nd Edition, revised.
PETERBOROUGH. 2nd Edition.
RIPON.
ROCHESTER. 2nd Edition.
ST. ALBANS.
ST. ASAPH.
ST. DAVID'S.
ST. PATRICK'S, DUBLIN.
ST. PAUL'S. 3rd Edition.
SALISBURY. 3rd Edition, revised.
SOUTHWELL. 2nd Edition.
WELLS. 3rd Edition, revised.
WINCHESTER. 3rd Edition, revised.
WORCESTER. 2nd Edition.
YORK. 3rd Edition.

Preparing.

GLASGOW. By P. MACGREGOR CHALMERS, I.A., F.S.A. (Scot.).
LLANDAFF. By HERBERT PRIOR.

Uniform with above Series. 1s. 6d. net each.

ST. MARTIN'S CHURCH, CANTERBURY. 2nd Edition.
BEVERLEY MINSTER. 2nd Edition.
WIMBORNE MINSTER AND CHRISTCHURCH PRIORY. 2nd Edition.
TEWKESBURY ABBEY AND DEERHURST PRIORY. 2nd Edition.
BATH ABBEY, MALMESBURY ABBEY, AND BRADFORD-ON-AVON CHURCH.
WESTMINSTER ABBEY.
STRATFORD-ON-AVON.

BELL'S HANDBOOKS TO CONTINENTAL CHURCHES.

Profusely Illustrated. Crown 8vo, cloth, 2s. 6d. net each.

CHARTRES: The Cathedral and Other Churches.
ROUEN: The Cathedral and Other Churches.
AMIENS.
PARIS (NOTRE-DAME).
MONT ST. MICHEL.
BAYEUX.

London: GEORGE BELL & SONS, York House, Portugal St., W.C.

GIBSON'S

COLOURED TILE MAP

OF ENGLAND AND WALES

ORNAMENTAL. USEFUL. PERMANENT.

THE TILE MAP, which we have just completed, is composed of over 126 Tiles, artistically Coloured and Finished. The MAP is carefully and accurately drawn, and is based on the **latest survey.**

The **colour scheme** has been so skilfully arranged that **artistic effect** has been added to **clearness of outline.**

The MAP measures 48 in. by 66 in., and is enclosed in a **HANDSOME TILED FRAME,** the whole measuring 54 in. by 72 in.

Many Artists, Architects, and Teachers have already expressed their approval of this MAP as suitable for all kinds of **Public and Private Buildings.**

MESSRS. R. GIBSON & SONS would specially call the attention of all **EDUCATIONAL AUTHORITIES** to the **useful** and **artistic** qualities of the TILE MAP. They will find it excellently adapted for the **Halls of Schools and Colleges.** It will add to the **brightness** of the Hall, and its constant appearance before the eyes of Pupils and Students cannot fail to impress upon their minds the outstanding Geographical Features of their Native Country. It can be **easily cleaned,** and is practically **indestructible.** It is not, therefore, exposed to the same risk of damage as the ordinary Wall Maps, which become dirty and dilapidated in a very short time.

Our Representative will be pleased to call and exhibit the MAP, or it may be seen at

R. GIBSON & SONS (GLASGOW), Limited
45 QUEEN STREET, GLASGOW

OUR SCIENCE SECTION

☞ **Subscribers requiring Explanations of Difficulties in any branch of Science, or Advice upon Courses of Study, can obtain all help required by communicating with the Editor, and accompanying their query with the Coupon cut from this number.**

CHEMISTRY.

(ADVANCED AND HONOURS.)

BY C. A. WEST, B.SC., A.R.C.S., F.I.C.

Strengths of Acids (*continued*).

The Catalytic Method.—When an ethereal salt such as methyl acetate CH_3COOCH_3 is mixed with water, a chemical action takes place. The ethereal salt is gradually but very slowly acted upon, with the formation of acetic acid and an alcohol. If methyl acetate is the salt used, then methyl alcohol is formed thus—

$$CH_3COOCH_3 + H_2O = CH_3COOH + CH_3OH \qquad (1)$$

The reaction also proceeds in the opposite direction, thus—

$$CH_3COO\,H + C\,H_3OH = CH_3COOCH_3 + H_2O \qquad (2)$$

for this is in reality a balanced action. However, if the amount of salt present is small compared with the amount of water, the reaction as represented by equation (1) proceeds until nearly all the salt has been changed, and the reaction may be looked upon for practical purposes as of a similar kind to the inversion of cane sugar. The rate at which the reaction proceeds, however, is extremely slow; but if we introduce an acid such as hydrochloric acid it becomes much accelerated, and the rate of acceleration is found to depend upon the acid introduced and upon the concentration of the acid. If then we take known quantities of water, methyl acetate and hydrochloric acid, and mix them, and then at once take a measured portion of the mixture and titrate it with a dilute alkali, we can estimate the percentage of hydrochloric acid present.

After a stated interval we can take another equal portion of the mixture and titrate it.

The increase in the alkali needed this time is due to the acetic acid formed during the reaction. Similar titrations made at regular intervals enable us to estimate the rate at which the reaction is proceeding at any stage, and by working with different acids we find that the figures expressing their relative accelerative powers come in the same order as those obtained by their actions in inverting cane sugar, and moreover the two sets of figures agree so closely that we are practically compelled to admit that although the two reactions are quite different there must be some factor common to them both. The figures also to a considerable degree agree with the figures obtained for the chemical avidities of the various acids. We may therefore reasonably employ either the inversion of cane sugar or the catalysis of methyl acetate as a method of comparing the strengths of acids.

The actual method of working with the catalytic method is as follows:—Mix 10 c.c. of a normal solution of the acid under investigation with 1 c.c. of methyl acetate, and dilute the mixture to 15 c.c.

Place the solution in a thermostat arranged so as to keep the temperature constant at 26° C. (the temperature employed by Ostwald).

At regular intervals take out by means of a pipette a definite volume of the mixture; dilute and titrate, and tabulate the results. The actual calculation of what is known as the velocity constant of the acid we will defer until we have studied the law of mass action, and will now pass on to the brief consideration of another practical method of comparing the strengths of acids, viz.:—

The Electrical Conductivity Method.—Some years ago Arrhenius pointed out the fact that if the acids are arranged in the order of the electrical conductivities of their equivalent solutions the order is the same as that of their avidities or velocity constants, and if in each case we refer all the figures to that of 100 for hydrochloric acid, the velocity constants obtained from the inversion of cane sugar or the catalysis of methyl acetate are not only in the same order, but in many cases they are practically identical.

Hence again we have here another method which may be used for determining the relative strengths of acids.

These various methods of comparing the relative strengths of acids do not at first sight appear to have anything in common with each other, although they seem to yield similar results; but after we have considered the laws of mass action and the dissociation hypothesis of Arrhenius we shall see that a common factor underlies these apparently unconnected methods.

Mass Action.

The analytical student will be familiar with a number of reactions which are generally classed as reversible. A good example of this class of reaction is afforded in the formation of manganese sulphide when sulphuretted hydrogen is passed into an aqueous solution of a manganese salt such as manganese chloride. The reaction proceeds according to the equation—

$$MnCl_2 + H_2S = MnS + 2HCl$$

We see that hydrochloric acid is formed at the same time, and experiment tells us that manganese sulphide is soluble in hydrochloric acid.

If we take manganese sulphide and treat it with hydrochloric acid of moderate strength it dissolves readily, and the reaction may be represented by the equation—

$$MnS + 2HCl = MnCl_2 + H_2S$$

We say that such a reaction is reversible, for it may go one way or the other according to circumstances, and we may represent such a reaction in the following manner—

$$MnCl_2 + H_2S \rightleftarrows MnS + 2HCl$$

replacing the sign of equality generally used by arrows with their heads pointing in opposite directions.

In the case of the precipitation of manganese sulphide from aqueous solution by means of sulphuretted hydrogen the hydrochloric acid formed during the reaction is not sufficiently concentrated to prevent some of the manganese sulphide remaining as such; but if we add a moderate quantity of hydrochloric acid before introducing the sulphuretted hydrogen, the precipitation is entirely prevented.

The mass of the hydrochloric acid present (or more strictly speaking, its relative concentration) evidently has an influence on the final result. If we wished we could find by experiment what concentration of the hydrochloric acid would be necessary to keep half (or other fraction) of the manganese in solution when the liquid is saturated with sulphuretted hydrogen.

Similarly for any given concentration of the hydrochloric acid a definite equilibrium will be attained, and when an equilibrium is reached we may regard the two reactions as proceeding in opposite ways but at equal rates.

Let us again consider the solution of manganese chloride. As soon as we introduce the sulphuretted hydrogen the formation of the manganese sulphide proceeds quickly. As soon as the sulphide begins to form so does the hydrochloric acid, and the reverse reaction sets in, and obviously if an equilibrium is to be established at all, the rate with which the sulphide forms must decrease, or the rate at which the reverse action proceeds must increase, or both may take place.

By studying a number of analogous cases, Guldberg and

THE

EDUCATIONAL MUSICAL INSTRUMENT CO.

(ESTABLISHED 1881.)

For Lists and Designs apply to the

MANAGER,

43 Estate Buildings, Huddersfield;
21 Argyle Crescent, Portobello, Edinburgh;
3 Unity Street, Bristol; or
19 Highbury Place, London, N.

MANY THOUSANDS of Teachers, School Managers, &c., including **Twenty-five of H.M. Inspectors of Schools,** are using and recommending our Instruments, of which we have specimens **in every County of the British Isles.**

SCHOOL PIANOS, &c., A SPECIALITY.

We have **over 1,800** in use, our large trade enabling us to offer unapproached bargains. You would also find our **Violin Outfits for Orchestral Classes** unequalled in quality and price.

See our **45 Guinea** Prize Medal Upright Iron Grand Piano for **£21 cash,** or thirty-six payments of 14s. 2d. per month. Quite new, rich, full tone, and thoroughly durable.

We pay carriage, give a month's free trial, a ten years' warranty, and **exchange free of cost** if the instrument sent is not all that is desired.

Dr. MACNAMARA, M.P., Editor of *The Schoolmaster*, writes under date August 30, 1904:—"We are more than delighted with the Piano which you recently selected for and supplied to us. Any of my friends who need an instrument cannot possibly do better than place themselves entirely in your hands."

Mr. J. H. YOXALL, M.A., M.P., Gen. Sec. N.U.T., writes:—"For the fourth time I have experienced for myself, or for relatives, the special value, wide selection, and expert advice which your clients gain. Each of the four Pianos has given perfect satisfaction."

Show-rooms open daily. Write for our List of Instruments for Home or School Use, specifying the class preferred.

WE CAN SAVE YOU MANY POUNDS.

(Please mention this Paper.)

Keith Prowse & Co

ESTABLISHED 100 YEARS.

NEW CENTURY NEW MODEL

CASH £26 FREE DELIVERY

OR 30 MONTHLY INSTALMENTS OF 21/-

Come & See It

—or—

WRITE FOR CATALOGUE MENTIONING THIS PAPER

48 CHEAPSIDE LONDON E.C.

Satisfaction

is assured to every purchaser of a

"SWAN" Pen

satisfaction as regards working, durability, and money well spent. We are so sure of this that we offer to refund the purchase money to any failing to obtain this satisfaction.

Size 1, "Swan" pocket size, 5¼" long. 10/6 complete.

Same as above, mounted with rolled gold bands, 14/6.

The Gold nib makes writing rapid and easy.

10/6, 16/6, 25/- upwards.

Sold by all Stationers & Jewellers.

WRITE FOR CATALOGUE

Mabie, Todd & Bard

79 & 80 High Holborn, LONDON

BRANCHES: 93 Cheapside, E.C., 95a Regent St., W.; 3 Exchange St., Manchester; and at New York and Paris.

"The most wonderful sixpennyworth among modern reprints."

—GLASGOW EVENING NEWS.

NELSON'S Sixpenny Classics

A New Series of the most popular reprints in **large readable type**, with beautifully printed Frontispiece. Tastefully bound in **Cloth**, with gilt lettering on back. Some of the volumes contain nearly **600 pages**. All are **unabridged**. The Series will form a handsome addition to the Library.

A TALE OF TWO CITIES (DICKENS).
TOM BROWN'S SCHOOL DAYS (HUGHES).
THE DEERSLAYER (FENIMORE COOPER).
HENRY ESMOND (THACKERAY).
HYPATIA (KINGSLEY).
THE MILL ON THE FLOSS (GEORGE ELIOT).

CLOTH, **6d.** EACH NET.

THE DAILY MIRROR says:
"A Really Wonderfully Cheap Series."

A BOOKSELLER writes:
"Sell like sovereigns at the price."

On Sale at all Booksellers and Bookstalls throughout the Country.

THOMAS NELSON & SONS 35 & 36 Paternoster Row, London, E.C.

EDINBURGH, DUBLIN, AND NEW YORK

Waage were able to make the general statement that "*the rate of chemical action is proportional to the* ACTIVE MASS *of each of the reacting substances.*"

Strictly speaking the law applies only to substances in the gaseous state or in a solution, as in the case of a solid the molecules are much more restricted and cannot act so freely. Guldberg and Waage by the active mass of a substance meant the molecular concentration of the substance. This is the same as the number of gram molecules per litre.

(It is probably true, as Arrhenius has pointed out, that the active mass of a substance in solution is not absolutely the same as the molecular concentration, but that it should be taken as being proportional to the osmotic pressure of the dissolved substance. However, in dilute solutions the osmotic pressure and the molecular concentration are practically proportional, and no serious error will be introduced by employing the molecular concentration as the active mass.)

PHYSIOGRAPHY.

(STAGES 2 AND 3.)

SPECTROSCOPY—(*Continued from p.* 643).

THE spectrum of the sun contains a large number of dark lines spoken of as Fraunhofer lines after their discoverer.

In the light of what we have now learned, we conclude that these dark lines are due to vapours in the sun's atmosphere. The photosphere of the sun appears to consist of either solid or liquid matter at an exceedingly high temperature and in a state of bright incandescence. It is surrounded by a gaseous envelope consisting of the vapours of the incandescent solids or liquids forming it. Now the photosphere will give out light of every wave length or white light. This light, before it comes to the earth, has to pass through the gases surrounding the body of the sun, and in doing so many of the rays are filtered out, each vapour absorbing the energy of vibrations of the same frequency as those which it could give out of itself if incandescent.

By taking the readings of the positions of these absorption lines on the spectrometer or spectroscope, and comparing them with the readings of the lines obtained from the various elements under various temperature conditions, we are able to prove that there are present in the sun's atmosphere the vapours of a considerable number of elements found on the earth. Amongst the most important of these are the following:—

Sodium.	Manganese.
Magnesium.	Aluminium.
Barium.	Iron.
Strontium.	Chromium.
Calcium.	Titanium.
Nickel.	Copper.
Cobalt.	Hydrogen.
Zinc.	Helium.

There are, however, many dark lines in the solar spectrum which we have not yet been able to match by means of the spectra of known elements.

This is possibly partly due to the fact that in the lower regions of the sun's atmosphere the temperature is so exceedingly high that we cannot in the laboratory attain any temperature approaching it. We know already from our experiments that the same substance may give different spectra at different temperatures, and so some of these lines may be due to known elements, but under temperature conditions of which we have no practical experience.

It is possible at the temperatures near the surface of the sun that the atoms of some of the elements may be broken up into smaller particles still. We have evidence which leads us to believe that in the cases of radium, uranium, thorium, and some other substances the atoms are gradually breaking up into smaller particles even at ordinary temperatures, and it is therefore not difficult to conceive the idea that similar disruptions of the atoms may readily be taking place at the level of the sun's photosphere.

However, by continued search we are gradually increasing our knowledge of the number of elements and the conditions under which they exist in the sun's atmosphere.

When we come to examine the spectra of the stars and nebulæ we find that conditions are often quite different from those existing on the sun.

About forty years ago, Dr. Huggins first examined the spectrum of a nebula by means of a spectrum apparatus attached to the end of a telescope, and he was surprised to find that it consisted practically of one bright line. This was so unexpected that at first he thought there was something wrong in the adjustment of his apparatus.

Further examination, however, showed that there were two other faint lines present. It was proved later that the bright line was due to magnesium at a comparatively low temperature, and that one of the faint lines was due to hydrogen.

Up to that time the nebulæ had been regarded by many as being clusters of stars. Their spectra, however, now tell us that they do not consist of stars like our sun, but that they consist of groups of meteorites which are heated by numerous collisions taking place between them.

The chief line observed in the spectra of the nebulæ is, as we have stated, due to magnesium, and we can reproduce it at will in the laboratory by burning magnesium ribbon in front of the slit of the spectroscope.

We may also reproduce the spectrum of a nebula in the following way: Place a few pieces of meteorite rich in magnesium, or some bits of olivine, in a glass tube through which two platinum wires have been fused in order to allow of an electric discharge being passed through the tube. Exhaust the tube by means of the Sprengel pump and seal it up. Now heat the pieces of meteorite or olivine for a time and place the tube in front of the slit of the spectroscope. Pass a discharge from an induction coil through the tube and a spectrum is produced showing the hydrogen lines and the magnesium line as seen in the spectra of many of the nebulæ. Under some conditions we get flutings instead of lines in the spectra. In the case of the spectra of some stars we find that the flutings are due to magnesium, iron, manganese, barium, &c., and the lines to calcium, iron, bismuth, sodium, and magnesium, and that in some cases the lines and flutings are dark ones due to absorption. The absorption in such a case is due to the vapours surrounding the meteorites which have been raised to incandescence by the collisions amongst them.

With some stars we get both bright and dark lines and flutings in the same spectrum. In these cases the bright flutings are due chiefly to carbon, and the dark ones due to the absorption caused by metallic vapours. In other cases absorption lines are predominant.

By studying the spectra of stars, various astronomers have attempted to classify the stars according to the physical and chemical conditions existing on them. Perhaps the best known of these is the classification elaborated by Sir Norman Lockyer, of which the following is a brief summary. The celestial bodies are divided into six groups:—

Group I.—This group includes nebulæ and stars giving bright line spectra. The lines are due chiefly to magnesium and hydrogen. A few of the stars give some absorption.

Group II.—In this group radiation and absorption generally occur together. The bright flutings and lines are due chiefly to carbon vapour, which fills the space between the meteorites, while the absorption is due to the vapours of iron, manganese, magnesium, barium, &c., surrounding the body of the star.

Group III.—In this group the temperature is higher, and the meteorites have been converted into vapour as the result of higher temperatures. Line absorption is predominant.

Group IV.—In this group we have the hottest stars. Simple line absorption is predominant, the absorption lines of hydrogen being specially marked, and the metallic lines are faint and thin.

Group V.—In this group the spectra are very similar to those of Group III. The temperature is decreasing and line absorption is predominant. The spectra are less complex, the lines are narrow but numerous, and show the presence of substances known to exist in meteorites and in the earth. The sun belongs to this group.

Group VI.—The stars of this group are none of them very bright, and are usually of a red tint. The main mass of the star has become either solid, liquid, or a very dense gas, and the atmosphere surrounding it consists mainly of carbon vapour, giving rise to carbon absorption bands.

WE have received the first number of a new sixpenny monthly called *The University Record*. We need only mention the names of such contributors as the Right Hon. James Bryce, Professors Schuster, Sonnenschein, Ronald Ross, and Churton Collins, and Sir Oliver Lodge, and no other guarantee of the high-class nature of its contents is needed. We trust that it will receive the strong support of those for whom it is intended.

Travel and Recreation

EVERY TOURIST HIS OWN INTERPRETER

BY USING

MARLBOROUGH'S

"SELF-TAUGHT" SERIES

OF

EUROPEAN & ORIENTAL LANGUAGES

Containing Travel-Talk for Railway, Steamboat, Customs, Hotel, Post Office, Shopping, Amusements, &c. Tables—Money, Weights and Measures. Conversations, Vocabularies, Elementary Grammar, arranged for Learning AT A GLANCE with ENGLISH PHONETIC PRONUNCIATION.

*†‡ French
*†‡ German
} Self-Taught.

*† Italian
*† Spanish
} Self-Taught.

‡*† L'Anglais Sans Maître. Wrapper, 1/- each.

‡*† Der Englische Dolmetscher. Cloth, 1/6 each.

*† Danish
*† Norwegian
*† Swedish
} Self-Taught. Wrapper, 2/- each.

*†‡ Portuguese
*†‡ Dutch
*† Russian
} Self-Taught. Cloth, 2/6 each.

* With Cycling Terms. † With Photographic Terms. ‡ With Motoring Terms.

Complete List of the "Self-Taught" Series on application.

Of all Booksellers, Bookstalls, and Tourist Agents.

LONDON: E. MARLBOROUGH & CO., 51 OLD BAILEY, E.C.

BELGIAN STATE RAILWAY AND MAIL PACKET SERVICE

LONDON TO OSTEND viâ DOVER

Every Saturday. Return Tickets, 13s. 8d., returning Saturday, Sunday, Monday, or Tuesday.

Cheap Eight-day Tickets issued from August 2 to August 7 from London or Dover to Ostend or Brussels.

Return Fares from	London	to Brussels	18s. 4d.
" "	Dover	"	11s. 9d.
" "	London	to Ostend	13s. 8d.
" "	Dover	"	7s. 7d.

Excursion Tickets at similar prices throughout the summer.

Cheap Excursions to Berne, Zurich, and Lucerne at less than single fares, July 20th, and August 3rd and 18th.

LIÈGE EXHIBITION

Seven-day Return Tickets Issued Daily.

London to Liège	£1, 2s. 6d.
Dover to Liège	18s. 5d.

Belgian Season Tickets, available 15 days, enabling the holder to travel all over the Belgian State Railways (about 2450 miles), price £1, 10s. 5d., including return ticket Dover-Ostend.

Rundreise (combined tour) Tickets issued at net official prices. Passengers can make up their own itinerary, and estimates of cost supplied gratis.

The fastest paddle steamers in the world, and most luxurious railway carriages.

For tickets, information, handbills, time-books, and tour-books (all gratis) apply to

BELGIAN MAIL PACKET OFFICES,
53 Gracechurch Street, E.C.; 72 Regent Street, W.; or to Messrs. Friend & Co., Dover.

MODERN LANGUAGES HOLIDAY COURSES, 1905.

Organised by the Teachers' Guild.

TOURS & HONFLEUR,

FRENCH;

NEUWIED (on Rhine),

GERMAN;

SANTANDER,

SPANISH.

COMMENCE EARLY IN AUGUST.

Short Preliminary Programme gratis. Handbooks, giving fuller particulars of the Courses, price 6d., post free, from the Office of the Guild, 74 Gower Street, London, W.C.

THE SCHOOLMISTRESS

WEEKLY PRICE ONE PENNY. CONTAINS HELPFUL ARTICLES ON ALL BRANCHES OF SCHOOL WORK. WEEKLY PRICE ONE PENNY.

TEACHERS not already Subscribers should order from their Newsagent, or forward Postal Order or Halfpenny Stamps to HOWARTH BARNES, 149 Fleet Street, London, E.C.

SUBSCRIPTIONS (Prepaid).

ONE SHILLING AND NINEPENCE for THREE MONTHS.
THREE SHILLINGS AND THREEPENCE for SIX MONTHS.
SIX SHILLINGS for TWELVE MONTHS.
— Post Free. —

The Best Paper for Pupil Teachers and all Mistresses.

Full Notes on Certificate Literature.

TELEGRAPHIC ADDRESS: "SCHOOLMISTRESS, LONDON."

Address: HOWARTH BARNES, 149 Fleet Street, LONDON, E.C.

Just Ready. **Handsomely Bound in Cloth Extra.**

Volume XXV. of THE PRACTICAL TEACHER.

SPECIAL OFFER TO TEACHERS.—The Publishers will be pleased to supply a copy of this useful volume, post free, at the reduced price of **8s. 6d.** Application should be made to

"The Practical Teacher" Offices:

THOMAS NELSON & SONS, 35 and 36 Paternoster Row, London, E.C.

THEORETICAL MECHANICS.

Stages 2 and 3, and Intermediate Science, London University.

BY FRANK CASTLE, M.I.M.E.,

Royal College of Science: Lecturer on Mechanics, etc., Morley College, London; Author of "Elementary Practical Physics," "Practical Mathematics," etc.

It will be advisable for those readers who intend to take the Examinations of the London University to carefully revise the various portions of the subject as outlined in the syllabus. Any text-book on the subject will serve for this purpose; in addition, the questions which have been set in recent Examination Papers together with the solutions (which may be obtained from recent issues of the *Practical Teacher*) will be of the greatest assistance, more especially to those who are working without the aid of a teacher.

A few questions and their solutions, from recent papers, may indicate to some extent the kind of revision referred to.

Ex. 1. Determine the thrust between the buffers of two railway carriages when the screw coupling is turned by a force of P lbs. at an arm of a ft., the right- and left-handed screw of the coupling each having n threads per inch. (Inter. 1903).

In questions of this kind in which friction is neglected, it is only necessary to apply the *principle of work*. Thus, if T denote the thrust between the buffers, then as the pitch of each screw is $\frac{1}{n}$, the distance moved through for one turn of the screw will be $\frac{2}{n}$.

The distance moved through by P in one turn will be $P \times 2\pi \times a$ feet, or $P \times 2\pi \times 12a$ inches. Hence equating we find

$$P \times 2\pi \times 12a = T \times \frac{2}{n}$$

$$\therefore T = 12a\pi nP.$$

Ex. 2. Determine the mechanical advantage of a screw lifting jack neglecting friction. Calculate the tension in a stay which is tightened up by a force of P pounds acting on a lever a inches long, which turns a double screw composed of a right-handed screw of m threads to the inch and a left-handed screw of n threads to the inch. (B.A. 1902).

Here, as in the preceding case, the distance moved through by P for one turn of the screw will be $P \times 2\pi a$. If T denotes the tension in the stay, then as the distance moved through for one turn is $\frac{1}{m} + \frac{1}{n}$, we obtain the relation

$$P \times 2\pi a = T\left(\frac{1}{m} + \frac{1}{n}\right)$$

$$\therefore T = \frac{mn \times P \times 2\pi a}{m+n}.$$

Ex. 3. Show how to connect linear and angular velocity, period, and revolutions per second, in uniform motion in a circle, and calculate the angular velocity of the hands of a clock.

Determine the revolutions per second of a bullet fired with a velocity of 2000 ft. per second from a rifle, the grooves of the rifling making one turn in 10 inches. (B.A. 1902).

If v is the linear velocity in feet per second of a point moving with angular velocity ω in a circle of radius r, then the relation is

$$v = \omega r. \quad \ldots \quad (1).$$

If n revolutions are described per second, then $\omega = 2\pi n$.

$$\therefore v = 2\pi nr. \quad \ldots \quad (2).$$

The period or periodic time may be obtained by using the relation $nt = 1$, where t denotes the periodic time.

For minute hand, as 2π radians are described in one hour = 3600 secs.,

$$\therefore \omega = \frac{2\pi}{3600} = \frac{\pi}{1800} \text{ radians per sec.}$$

For the hour hand 1 revolution corresponds to 12 hours,

$$\therefore \omega = \frac{2\pi}{12 \times 3600} = \frac{\pi}{21600} \text{ radians.}$$

As one turn is made in 10 inches, if n denote the number of revolutions per sec.,

$$\therefore n = \frac{2000 \times 12}{10} = 2400.$$

Ex. 4. Define (i.) angular velocity; (ii.) angular acceleration.

A carriage wheel of radius a is rotating with angular velocity ω, find the speed of the carriage. Find also, at any instant, the actual velocities of the points of the wheels which are at the extremities of the vertical and horizontal diameters.

(*Ans.* $a\omega$, $2a\omega$, v, $a\omega\sqrt{2}$). (B.A. 1900).

Ex. 5. Explain how a velocity is specified, and how velocities are compounded.

If a particle is to move uniformly with velocity v round the perimeter of a regular polygon of n sides. Show that at each point a certain velocity must be impressed upon it: find the full specification of this velocity.

(*Ans.* $\frac{2v \sin \frac{\pi}{n}}{n}$ towards centre). (Inter. 1900).

Bell's Cathedral Series.—Prominent among handbooks for the tourist and traveller are the volumes in this admirable series. Last year we drew special attention to a volume on the churches of Rouen, one of a series of six handbooks to Continental Churches, published, in cloth covers and fully illustrated throughout, at 2s. 6d. net. The series which deals with the Cathedrals at home contains no less than thirty-six volumes, and each is issued at 1s. 6d. Such handbooks are excellent companions to the tourist whether at home or abroad, and as they are of a handy size and easily carried in the pocket, our holiday readers should not fail to provide themselves with the necessary volume before leaving home. Prepared by competent writers, such beautiful and carefully illustrated handbooks are much to be preferred to the cheap, scrappy trifles usually offered for sale within the shadow of the cathedral one may happen to visit. In addition they prove valuable works of reference for all time. The fullest particulars of both series may be found in the prettily illustrated miniature catalogue to be had upon application to Messrs. G. Bell & Sons, Portugal Street, Lincoln's Inn, W.C.

We have received from Messrs. Gillott & Sons, penmakers to His Majesty the King, a small box containing specimens of no fewer than thirty varieties of steel pens. We venture to bring these to the notice of our readers, who often find a difficulty in deciding which pen to adopt in their schools. A similar box will be sent to any address for seven stamps. They are all beautifully finished pens, but of course some are better suited for a given style of writing than the others.

Travel and Recreation

"Absolutely accurate."—*Cycling.*
"Handy and reliable."—*C.T.C. Gazette.*
"They are the best road books."—*Scottish Cyclist.*

THE
'CONTOUR' ROAD BOOKS
By HARRY R. G. INGLIS.

500 Maps and Plans in each volume.

Price **2/-** each (net). India Paper, **3/6.**

ENGLAND. Complete in three volumes :—
Northern Division (all north of Leicester).
South-East Division (London Section).
Western Division (S.W., Midlands, and Wales).

SCOTLAND. Complete in one volume.

IRELAND. Preliminary volume, 200 Contour Plans, **1/-**

Specimen of one of the 2200 "Contour" Plans.

GALL & INGLIS, 25 Paternoster Square, London; and EDINBURGH.

GALL & INGLIS' CYCLING MAPS and ROAD BOOKS
SOLD EVERYWHERE.
Always ask for Gall & Inglis' Maps.

FOR CYCLISTS AND TOURISTS
CLEAR, RELIABLE, AND CHEAP
HOULSTON'S DISTRICT HANDY MAPS
Reduced from the Ordnance Survey to a Scale of Four Miles to an Inch.

4d. *Each Map comprises a District of about 2000 Square Miles* **4d.**
EACH, IN WRAPPER FOR THE WAISTCOAT-POCKET.

1. Lake District
2. Scarborough, Whitby, and District
3. Buxton and Peak District
4. Derbyshire
5. Warwickshire
6. Chester and District
7. Liverpool and District
8. Preston, Fleetwood, and District
9. Newcastle and District
10. Leeds and District
11. Bradford and District
12. Sheffield and District
13. North Wales
14. Central Wales
15. South-Western Wales
16. Malvern and District
17. Bristol, Bath, and District
18. Middlesex and Environs of London
19. Windsor and District
20. Kent Watering-places
21. Hastings and District
22. Brighton and District
23. Isle of Wight and Hampshire Watering-places
24. South Devon
25. North Devon
26. Dorset
27. Somerset, Central
28. Wiltshire
29. Gloucester, Cheltenham, and District
30. Plymouth and Dartmoor
31. Land's End and Western Cornwall.
32. Surrey.
33. Manchester and District
34. Birmingham and District
35. Cambridge and District
36. Nottingham and District
37. Northampton and District
38. Lincoln and District
39. Oxford and District
40. Carlisle and District
41. Durham and District
42. York and District
43. Potteries and District
44. Leicester and District
45. Wolverhampton and District
46. Leamington and District
47. Ipswich and District
48. Norwich and District
49. Essex Watering-places
50. Monmouth and the Wye
51. Hull and District
52. Shropshire
53. Bedfordshire
54. Hertfordshire
55. Reading and District
56. South-Eastern Wales
57. Ripon and District
58. Huntingdon and District
59. Peterborough and District
60. Doncaster and District
61. Hereford and District
62. Exeter and District
63. Bournemouth and District
64. Buckingham and District

Also, price **4d.** each, uniform with the above,
A Handy Map of London. Scale, Two Inches to a Mile.
A Handy Map of the Isle of Wight. Scale, Two Miles to an Inch.

HOULSTON & SONS, 7 Paternoster Buildings, LONDON, E.C.

"ALLIANCE FRANÇAISE."
FRENCH HOLIDAY COURSES by the Sea-side
At VILLERVILLE, near TROUVILLE (Normandy), AUG. 1905—7th Year.
General Preparation—Special Preparation for the Lond. B.A., 1905.
Syllabus post free on application to **Prof. L. BASCAN, Caen,** Author of "Spoken French," "Légendes Normandes," &c.

LANTERN SLIDES, BEST .... WET-PLATE
Geography, Science, Art, History, &c.
List Free from WILSON, LOCHHEAD, ABERDEEN.

NELSON'S ROYAL COPY BOOKS.
Price 2d. each.

FOR SIMULTANEOUS INSTRUCTION IN WRITING.
A CLEAR AND RAPID COMMERCIAL HAND.
SLOPE AND STYLE OF CIVIL SERVICE WRITING.

By using the "Royal Copy Books," the whole class can always copy the same headline at the same time. This great advantage has been attained by a novel arrangement—the *Headlines being cut away from the body of the Copy Book, but firmly stitched in the same Cover.* The headline above each page can thus be changed as often as desired, and in this way the copying by the scholars of their own writing instead of the headlines will be completely obviated.

THOMAS NELSON & SONS, 35 and 36 Paternoster Row, London, E.C.;
Edinburgh, Dublin, and New York.

OUR QUERY COLUMN

RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the name and address of the correspondent, and the *coupon* which appears on the back wrapper of the current number of the Journal.
3. CORRESPONDENTS MUST IN ALL CASES STATE THE SOURCE FROM WHICH THEIR QUERY HAS BEEN OBTAINED.

The Editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

Utopia.—A is a station exactly 10 miles west of B. The bearing of a particular rock from A is 74° 19′ east of north, and its bearing from B is 26° 51′ west of north. How far is it north of the line joining A and B?

$\llcorner$ sin 15° 41′ = 9·4318788
$\llcorner$ sin 78° 50′ = 9·9916991
$\llcorner$ sin 63° 9′ = 9·9504583
log 2·4583 = 0·3906349
log 2·4584 = 0·3906525

Let C be the position of the rock. Then by the question we have $\angle BAC = 90° - 74° 19′ = 15° 41′$
and $\angle ABC = 90° - 26° 51′ = 63° 9′$
Hence $\angle ACB = 180° - (15° 41′ + 63° 9′) = 180° - 78° 50′$

From C draw CM perpendicular to AB. From the triangle ABC we have

$$BC : AB :: \sin BAC : \sin ACB$$

$$\therefore BC = AB \frac{\sin BAC}{\sin ACB} = 10 \frac{\sin 15° 41′}{\sin 78° 50′}$$

$$\therefore \log BC = \log 10 + \log \sin 15° 41′ - \log \sin 78° 50′$$

$\log 10 = 1$·
$\log \sin 15° 41′ = \bar{1}·4318788$
$0·4318788$
$\log \sin 78° 50′ = \bar{1}·9916991$
$\therefore \log BC = 0·4401797$

From the right-angled triangle CMB we have—

$$CM = BC \sin 63° 9′$$

$$\therefore \log CM = \log BC + \log \sin 63° 9′$$

$\log BC = 0·4401797$
$\log \sin 63° 9′ = \bar{1}·9504583$
$\therefore \log CM = 0·3906380$
But $\log 2·4583 = 0·3906349$
difference $0·0000031$
But $\log 2·4584 = 0·3906525$
$\log 2·4583 = 0·3906349$
difference $0·0000176$

Now $\frac{31}{176} = 18$, nearly.

$\therefore CM = 2·458318$ miles, nearly.

Audax.—ABCDE is a regular pentagon, and forces acting at a point are represented in magnitude and direction by the lines AB, AC, AD, AE, BC, BD, BE, CD, CE, DE: prove that the magnitude of their resultant is represented by 4AE + 2BD.

The forces AB, BC, CD, DE have AE for their resultant. Hence the resultant of AB, BC, CD, DE, AE is represented in magnitude by 2AE.

Again BD is the resultant of BC, CD
AD " " " AE, ED
BE " " " BA, AE
And the resultant of AC, CE is AE.

Hence the resultant of the ten given forces is represented in magnitude by 5AE, together with the resultants of BC, CD and ED, BA; that is by

4AE + BD + BA, AE + ED,
that is by 4AE + BD + BE, ED,
that is by 4AE + BD + BD,
that is by 4AE + 2BD.

Coach.—Ash saplings after 5 years' growth are worth 1s. 3d., and increase in value 1s. 3d. yearly. For their growth they each require twice as many square yards as the number of years they are intended to grow before cutting. A plantation is arranged so that each year the same number may be cut. Find the greatest annual income which can be obtained per acre, allowing 20 per cent. for expenses.

(Pendlebury's Arithmetic.)

By cutting every 5 years the yearly income

$$= \frac{1}{5} \times \frac{4840}{10} \times £\frac{1}{16}$$

$$= \frac{121}{4} \times £0·2.$$

By cutting every 6 years the yearly income

$$= \frac{1}{6} \times \frac{4840}{12} \times £\frac{2}{16}$$

$$= \frac{121}{4} \times £0·2\dot{7}.$$

By cutting every 7 years the yearly income

$$= \frac{1}{7} \times \frac{4840}{14} \times £\frac{3}{16}$$

$$= \frac{121}{4} \times £0·305 \quad . \quad . \quad . \quad .$$

By cutting every 8 years the yearly income

$$= \frac{1}{8} \times \frac{4840}{16} \times £\frac{4}{16}$$

$$= \frac{121}{4} \times £0·3125.$$

By cutting every 9 years the yearly income

$$= \frac{1}{9} \times \frac{4840}{18} \times £\frac{5}{16}$$

$$= \frac{121}{4} \times £0·305 \quad . \quad . \quad . \quad .$$

Hence the annual income is greatest when the plantation is cut every 8 years. The income is then

$$\frac{121}{4} \times £0·3125.$$

But 20 per cent. (or one-fifth) of this goes in expenses. There remains therefore

$$\frac{4}{5} \times \frac{121}{4} \times £0·3125, \text{ or } 121 \times £0·0625;$$

that is $\frac{£121}{16}$, or £7, 11s. 3d.

RELFE BROTHERS, LIMITED

Desire to call the attention of PRINCIPALS OF SCHOOLS to the

Splendid Collection of PRIZE BOOKS

NOW IN STOCK AND ON VIEW AT THEIR SHOW ROOMS

The Best Variety in London. In all Bindings. at Lowest Prices for Best Work.

SPECIAL VALUE IN REMAINDERS

EVERY ATTENTION PAID TO VISITORS, WHETHER PURCHASERS OR NOT.

CATALOGUE AND REMAINDER LIST POST FREE ON APPLICATION.

RELFE BROTHERS, Limited, 6 Charterhouse Buildings, Aldersgate, London, E.C.

MANCHESTER Correspondence College.

PHYSIOGRAPHY.
MATHEMATICS.
CHEMISTRY.
SOUND, LIGHT, AND HEAT.
MAGNETISM AND ELECTRICITY.
MECHANICS.
PHYSIOLOGY.
HYGIENE.
NATURE STUDY.
BOTANY.
ZOOLOGY.
BIOLOGY.

Correspondence tuition is given in the subjects enumerated for the **BOARD OF EDUCATION (S.K.), MATRICULATION, INTERMEDIATE SCIENCE, SCHOLARSHIP, CERTIFICATE, A.C.P., L.L.A.,** and other examinations. Prospectus, with full particulars of Prizes ranging in value from 5s. to £5, will be sent on application. Intending students should join at once.

TERMS—S.K. (20 lessons) Elementary, 10s.; Advanced, 15s.

Address—Secretary, Manchester Corr. College, 58 Grosvenor Street, Manchester.

Teachers and School Managers should send for Specimen Cards of Joseph Gillott's School Pens—for 74 years the best.

The public has learned to associate the name of Joseph Gillott on a pen as the standard of highest excellence. There are hundreds of varieties, to suit all hands.

In Sixpenny and Gross Boxes, of Stationers and from W. H. Smith & Son's Bookstalls. **Sample Card of School Pens** free on receipt of Penny Stamp for postage. **Sample Box of Thirty Pens, assorted,** for testing, Seven Stamps.

JOSEPH GILLOTT & SONS, 37 Gracechurch Street, London, E.C.

EXAM. BOOK-KEEPING, &c.

Sarll's Text-Book Sales over 200,000 Copies.

SARLL'S BOOK-KEEPING FOR NEW CODE. Stage I. Introductory; II. Practical; III. Theory or Journalising. Each 48 pp. Price **4d.** Outline Keys. *Schoolmaster* says:—"They are the *best and cheapest* manuals of the kind in the market." MS. Books, **2d.** each.

SARLL'S PRACTICAL BOOK-KEEPING. Fourteenth and *greatly* improved Edition. *Teachers' Aid* says:—"There is no *cheaper* and *safer* guide." Consists of Grad. Exercises and Exam. Papers, with *full* or *outline* Keys. 128 pp. **1s.** MS. Books, superior, **1s.** Cheap, **4d.**

SARLL'S DOUBLE-ENTRY BOOK-KEEPING. Fifteenth Edition. **2s.** Complete with *full* or *outline* Keys. *Practical Teacher* says:—"We *heartily* recommend it as the *best* and *cheapest* manual we have seen." For Soc. of Arts Exams., Civil Service, &c. 256 pp. MS. Books, **1s.** Cheap, **4d.**

SARLL'S TWENTIETH CENTURY EXAM. PAPERS IN BOOK-KEEPING. Containing the *latest* papers by the *leading* Examining Boards, with notes and brief answers, in *two* parts, Sixpence each. Part I., Junior Papers, College of Preceptors, University Local, &c. Part II., Senior Papers, Society of Arts, London Chamber of Commerce, &c.

SARRL'S STUDENTS' BOOK-KEEPING. Chapters—Introductory, Theory, Practice, Exam. Papers, Trial Balances, Company Book-keeping, Mis. Difficulties, Sup. Papers, &c., &c. All Exercises with *full* or *outline* Keys. Over 400 pages. Price **3s. 6d.** *In the Press, and ready in January.*

SUPPLEMENTARY KEYS

I. **TO SARLL'S PRACTICAL.** Exercises Fully Worked. **2s.**

II. **TO SARLL'S DOUBLE-ENTRY.** Exercises Fully Worked. **3s.**

*** **Specimen Copies—except Keys—at one-third off, or Teachers can have Parcels, for inspection, Post Free, from A. SARLL, A.K.C. (Lecturer, People's Palace, E., Polytechnic, W., Goldsmiths' Institute, S.E., &c.), 62 Oakley Road, London, N.**

Lessons by Correspondence and Exams. conducted.

London: GEORGE GILL & SONS, 13 Warwick Lane, E.C.

NELSON'S BLACKBOARD DRAWING

By ALLEN W. SEABY

Art Master, Day Training Department, University College, Reading

With a Prefatory Note by WALTER CRANE

*** This book has but one aim—that of helping Students and Teachers to express clearly and readily their mental images of objects, and to assist in developing a power of expression which is allowed to lie dormant in most of us.

With 100 pages of Specially Prepared Blackboard Drawings

4to, cloth boards, 3/6 net.

THOMAS NELSON & SONS, 35 & 36 Paternoster Row, London, E.C.; Edinburgh, Dublin, & New York.

THE HUMAN BODY

A Physiology Reader for Schools.

170 pages. Illustrated. Price 1s. 6d.

BY

JOHN BERRY HAYCRAFT, M.D., Etc.

PROFESSOR OF PHYSIOLOGY IN THE UNIVERSITY OF WALES, CARDIFF.

CONTENTS.

1. What is Physiology?
2. The Body as a Machine.
3. The Body as a Machine.
4. The Body as a Machine.
5. The Body Studied by the Aid of the Microscope.
6. The General Form of the Body.
7. The Bones.
8. The Muscles and their Movements.
9. The Muscles and their Movements.
10. The Muscles and their Movements.
11. The Nervous System.
12. The Nervous System.
13. The Nervous System.
14. The Digestive Canal.
15. The Digestive Canal.
16. The Digestive Canal.
17. The Digestive Canal.
18. The Digestive Canal.
19. Food.
20. Digression on Fermentation.
21. Digestion.
22. Food after Absorption.
23. Diet.
24. Diet.
25. The Organs of Excretion.
26. Blood and its Circulation.
27. Blood and its Circulation.
28. Blood and its Circulation.
29. The Heart.
30. The Respiration.
31. The Respiration.
32. Restoration after Drowning.
33. The Voice.
34. The Voice.
35. Animal Heat.
36. Sensation.
37. The Skin and the Sense of Touch.
38. Taste and Smell.
39. The Ear.
40. The Eye.

THOMAS NELSON & SONS,

London, Edinburgh, Dublin, and New York.

THE EDITOR'S TABLE

E. J. ARNOLD AND SON, LTD., LEEDS.

The "A. L." Bright Story Readers. Swiss Family Robinson, Grade IV.; Robinson Crusoe, Grade V.; and Brave Tales from Froissart, Grade VI. These form admirable supplementary readers. The choice of subjects is as excellent as the selections the editor—Mr. Alfonzo Gardiner—sets before the young people. Perhaps the most interesting is the *Tales from Froissart*. The tales are certainly the most uncommon, and, as they introduce the children to old-time language and manner of expression, they should be of use in more ways than may be found in the ordinary reading lesson.

The "A. L." Little Stories for Little Readers. A Tale of Cock-Robin, Dot and Ned. As the name implies, these readers are published for the use of little children. The words are easy, and the expressions such as the little ones should be able to understand.

Moffatt's Plays of Shakespeare—Henry V., and Macbeth. These two plays are carefully edited by Mr. Thomas Page, and are well published. We like the idea of leaving a column on each page of the text for the student's own additional notes and references, though as far as the notes are concerned we fear he will have little to do, as those by the editor are full and to the point. The introduction contains a host of valuable literary information.

BLACKIE AND SON, LIMITED, 50 OLD BAILEY, LONDON, E.C.

Blackie's Commercial Course of Writing Books 1 to 6. Price 2d. each. This series of copy books has been specially prepared for commercial classes in continuation and other schools. They admirably fulfil their purpose, and deserve an extensive sale. The style is a slight modification of Vere Foster's medium style. Any pupil who goes carefully through these books cannot fail to acquire a good round, bold official hand, in a style well calculated to satisfy handwriting requirements at the beginning of a commercial career. In addition, the copies themselves give some practice in book-keeping, and also aid the student in acquiring considerable knowledge as to the meaning of commercial forms, terminology, &c. We cordially recommend this excellent and thoroughly practical series to the notice of our readers at home and abroad.

J. M. DENT AND CO., BEDFORD STREET, LONDON, W.C.

Dictionnaire complet illustré de la langue française. This well-known volume by Pierre Larousse now makes its appearance in England by special arrangement with Messrs. Dent & Co. A French dictionary with explanations in French is of immense service to all but the mere elementary student, and such a book as this ought to be in the hands of every pupil-teacher and private student throughout the country. The book is beautifully printed on thin hard paper, and profusely illustrated from A to Z. With such a means of acquiring an extensive and varied vocabulary, much time will necessarily be gained by the student; and further, after very little practice, the use of explanations in French cannot fail to make the study much more enjoyable. Scholarship, Certificate, and Matriculation students will do well to provide themselves with a copy of this invaluable, handy, and cheap work (2s. 6d. net).

HACHETTE AND CO., KING WILLIAM STREET, STRAND, LONDON.

The Public School French Grammar. Based upon the Grammaire Française of Auguste Brachet, Lauréat de l'Académie Française. By Elphege Janau, Examiner in the University of London, &c.; and Alfred Ludwig, B.A., Officier d'Académie, &c. Part II., Syntax. This is a work of eminence in its origin and its accomplishment. It is admirably complete and thorough, and its arrangement leaves nothing to be desired. Though somewhat formidable in its dimensions, its plan could not well admit of further compression. For senior pupils it is a work which can be unhesitatingly recommended.

HEINEMANN, BEDFORD STREET, LONDON, W.

The Country Day by Day. By E. Kay Robinson, author of "To-day with Nature," &c. Illustrated with photographs. Three hundred and sixty-five pages, each devoted to its day, and each day recording some aspect or event in the out-door life of the common world around us—this is a contribution of some value to those who would learn to see nature. As a book to read, it suffers from the same disadvantage as the dictionary—a slight want of connectedness—but it has this compensation, that one can find with a minimum of trouble what natural phenomena are in season at any given time. The photographs of birds' nests, &c., are excellent, and should encourage many young readers to follow this legitimate and interesting method of "taking" nests and eggs. It is a capital book for boys and girls in town or country. An index would have enhanced its value.

JOHN HOGG, LONDON.

Stained Glass Work: a Text-book for Students and Workers in Glass. By C. W. Whall. With Diagrams by two of his Apprentices, and other illustrations. (The Artistic Crafts Series of Technical Handbooks.) This book will naturally appeal to a limited circle, as the aim is not merely to write about stained glass work for the general reader or even the amateur, but to provide a work of practical utility to the practical worker. So far as we are able to judge, this aim is well accomplished. The writing is clear, terse, not without humour, and full of the vigorous thought of an earnest and enthusiastic craftsman. The boy who assimilates what is here offered will, we doubt not, gain much in efficiency as a workman, and we are quite sure he will imbibe such a view of the principles of all earnest work that he will likewise become a better man in every sense of the word.

LONGMANS, GREEN AND CO., PATERNOSTER ROW, LONDON.

Village Life in Palestine: a Description of the Religion, Home Life, Manners, Customs, Characteristics, and Superstitions of the Peasants of the Holy Land, with reference to the Bible. By the Rev. G. Robinson Lees, B.A., F.R.G.S., Vicar of St. Andrew's, Lambeth; author of "Jerusalem Illustrated," &c. With fifty illustrations from photographs. (New Edition, revised and enlarged.) The writer is well qualified, by his residence in Palestine and his knowledge of the language of the common people, to present a reliable picture of village life there. The book is written in a simple and unpretentious style, but what it loses in completeness of logical presentation is more than gained in the graphic pictures it presents. To teachers of the Bible the book has a special value, and the writer is well able to throw a new light on many passages and phrases of Scripture from the features of life in the "unchanging East" which persist from the centuries of the past. The illustrations are admirable, and must be in many cases unique.

FREDERICK WARNE AND CO., BEDFORD STREET, LONDON, W.

Wayside and Woodland Blossoms: a Pocket Guide to British Wild Flowers for the Country Rambler (First Series). New Edition. With clear description of 394 species by Edward Step, F.L.S. With coloured figures of 127 species by Mabel E. Step. It is almost superfluous at this time of day to praise this admirable series of flower-studies, with the help of which Mr. Step has done much to open the eyes of our young people to the wealth of beauty and interest which surrounds them on every country ramble. The short descriptions are simple and non-technical in style, and embrace many points of interest which a strictly scientific work would omit. The numerous full-page coloured plates are very well reproduced, and are worthy of the text which they enrich. In its earlier form we enjoyed the use of Mr. Step's helps to flower-study; we mean to pass on the enjoyment to those of a younger generation now, and the indications are that they will "consider the lilies" with some pleasure and profit under Mr. Step's guidance.

BRITISH MUSEUM 27 JU 1905

BOOKS FOR HOLIDAY READING.

The Pioneer Series of Pocket Volumes in Large Type on Royal India Paper.

NELSON'S NEW CENTURY LIBRARY

India Paper. Large Type.

OF STANDARD AUTHORS.

EACH WORK COMPLETE IN ONE VOL.

Large Type.
India Paper.

½ inch = 1000 pages.

The Masterpieces of English Fiction in Large Type. Printed on Thinnest Opaque Paper in the World.

Prospectus and Specimen Pages post free on application.

DICKENS. THACKERAY. SCOTT. LYTTON.
JANE AUSTEN. BRONTË. KINGSLEY. LEVER.
} Cloth, gilt top, 2s. net. Leather, limp, 2s. 6d. net. Leather boards, 3s. net.

TENNYSON. CARLYLE. CERVANTES.
BURNS. BUNYAN. IRVING.
} Cloth, gilt top, 2s. 6d. net. Leather, limp, 3s. 6d. net.

On Sale at all Booksellers throughout the Country. Ask for "NELSON'S NEW CENTURY LIBRARY."

THOMAS NELSON & SONS, 35 and 36 Paternoster Row, London, E.C.
Edinburgh, Dublin, and New York.

DELICIOUS COFFEE

RED WHITE & BLUE

FOR BREAKFAST & AFTER DINNER.

In making, use less quantity, it being so much stronger than ordinary COFFEE.

England's Best Value

"BONGOLA" TEA

Has no Equal

NOW READY. *Price 3d.; post free, 4d.*

The PRACTICAL TEACHER'S ART MONTHLY for JULY.

FULLY ILLUSTRATED CONTENTS.

SOME NOTABLE FRENCH ETCHINGS.
THE DAILY ROUNDS OF A DRAWING INSPECTOR.
A COURSE OF DRAWING FOR PRIMARY SCHOOLS.
SIMPLE CRAFTS.
METAL WORK FOR SCHOOLS.
A COURSE OF STUDY IN THE ARTS.
FISH STUDIES FOR SCHOOLS.
ARCHITECTURE FOR TEACHERS.
A PAGE FOR ADVANCED PUPILS.
HARMSWORTH ENCYCLOPÆDIA COMPETITIONS.

Order from your Bookseller now, or send to

"The Practical Teacher" Office, Messrs. T. NELSON & SONS, 35 and 36 Paternoster Row, London, E.C.

Nelson's Prizes

Messrs. NELSON'S Gift and Prize Books for the Young are the work of

The Best Writers of the Day. The Firm's imprint is a guarantee of excellence and of purity of tone. They are beautifully produced, and are illustrated by

The Leading Artists. In nearly all their New Books the pictures are in colours, adding enormously to their attractiveness at no increase in cost. These are reproduced by

The Finest Colour Printing Processes and the most modern machinery. Their

Coloured Picture Books for Children have a great reputation, and are steadily supplanting the cheaply "printed on the Continent" work still too common. They are entirely Home manufactured.

Standard Literature in Poetry, Fiction, Travel, Science, &c., in great variety, notably their

India Paper Editions of the Great Masterpieces of Fiction, &c., in exquisitely neat forms.

Writers for the Young

Harold Avery
Sheila E. Braine
Mrs. Glasgow
Evelyn Everett-Green
E. L. Haverfield
Herbert Hayens
Mrs. Edwin Hohler
Raymond Jacberns
Geraldine Mockler
Dr. Gordon Stables
Fred Whishaw
C. W. Whistler
and many others.

Stories by the late
R. M. Ballantyne
W. H. G. Kingston
Talbot Baines Reed
and other favourite writers.

Artists

John Bacon
John Hassall
W. H. Margetson
W. Rainey
and many other well-known artists.

*** *Complete Illustrated Catalogue post free on application*

THOMAS NELSON & SONS, 35 and 36 Paternoster Row, London, E.C.

EDINBURGH, DUBLIN, AND NEW YORK

Thomas Nelson & Sons' Royal School Series

☞ Stages 1, 2, 3, and 4, with Handbooks, have been adopted by the London County Council Education Department

NOW READY

Stage V.

NELSON'S NEW DRAWING COURSE

By J. VAUGHAN

Director of Drawing and Manual Training, Glasgow School Board, late Art Master, School Board for London

Ten Sheets printed on both sides—one side outline, the other in Colour. Size 20 by 25 in., on Stout Cards in Strong Cloth Portfolio, **15s.**

SPECIAL FEATURES

1. The Course provides a Complete series of examples in (a) Outline Drawing from Nature and Objects; (b) Brush Drawing from Nature, with adaptations to pattern; (c) Clay Modelling; (d) Mechanical Drawing; (e) Cardboard Modelling.
2. It gives a perfect correlation of all these branches—not treating each one separately, but dealing with them as a whole.
3. The work of each sheet is made to cover a definite period in all branches.
4. The Handbooks (supplied separately) deal exhaustively with the educational and practical side of each subject, and contain hundreds of illustrations.
5. Absolutely nothing else is needed in the way of charts or books. The Series covers all work that is usually done in Primary Schools.

Prospectus of the Full Course, including Handbooks, and Drawing Cards, post free on application

THOMAS NELSON & SONS

35 and 36 Paternoster Row, London, E.C.; Edinburgh, Dublin, and New York

COOK'S
Forthcoming Arrangements

Round the World under Personal Escort, leaving August 26th.

Select Conducted Tours.

THE AUSTRIAN ALPS (THE SALZKAMMERGUT), leaving July 25, August 15, and September 5.

PARIS and SWITZERLAND, including Andermatt, Furka and Grimsel Passes, Chamounix, &c., fortnightly during season.

BELGIUM, RHINE, BLACK FOREST, and SWITZERLAND, &c., frequently during season.

HOLLAND, THE RHINE, and BELGIUM, July 15 and 29, August 12, 26, &c.

PARIS, SWITZERLAND, and RHINE, leaving July 22, August 5, 19, &c.

THROUGH THE DOLOMITES, July 7, August 4 and 25.

SWISS ALPINE TOURS, July 12, 26, August 9 and 23.

GERMANY and AUSTRIA, July 10, 31, August 21, September 11.

SCOTLAND.—THE TROSSACHS and HIGHLANDS, fortnightly, from July 12.

TROSSACHS, HIGHLANDS, and BALMORAL TOURS, July 5, 19, and fortnightly.

MOUNTAINS and LOCHS TOURS, alternate Fridays during July, August, and September.

IRELAND.—KILLARNEY and the SOUTH OF IRELAND, fortnightly, from July 3, weekly during August.

ACHIL and CONNEMARA, fortnightly, from July 1.

Tours to Norway, &c.

Conducted Parties.

WESTERN NORWAY.—Leaving every Tuesday and Saturday during Season. 15 guineas.

THE FJORDS, LAKES, and MOUNTAINS of NORWAY.—Leaving July 18, August 1, 15, &c. 18 guineas.

SOUTHERN and WESTERN NORWAY.—Leaving weekly during July and August. 20 guineas.

CAPITALS of DENMARK, SWEDEN, and NORWAY. Leaving July 17 and August 14. 38 guineas.

Inclusive fares, providing travel, hotels, excursions, fees, transfers, conveyance of baggage, conductor, &c.

Independent Tours.

By the principal Railway, Steamship, and Carriage Routes to the NORWEGIAN FJORDS, NORTH CAPE, and all parts of SCANDINAVIA, with or without hotel accommodation.

Pleasure Cruises.

Leaving at frequent intervals throughout the Season by the following first-class steamers:—

VECTIS. OPHIR. DUNVEGAN CASTLE. MIDNIGHT SUN. ST. SUNNIVA. RAGNVALD JARL. VEGA.

Descriptive Illustrated Programmes, with Maps, &c., of all the above arrangements, free on application.

Conducted Excursions.

PARIS, VERSAILLES, SÈVRES, &c., every Saturday and Monday.

HOLLAND and DEAD CITIES OF THE ZUYDER ZEE, every Saturday.

BRUSSELS, FIELD OF WATERLOO, and ANTWERP, every Saturday and Monday.

THE RHINE, visiting Cologne, Königswinter, Coblence, Boppard, Bingen, and Wiesbaden, leaving July 8, 22, August 5, 19, September 2 and 16.

Popular Tours.

A WEEK IN SWITZERLAND . . .	£5	5	0
PARIS and LAUSANNE or MONTREUX	7	7	0
A WEEK at LUCERNE or INTERLAKEN	7	7	0
ZURICH and FALLS OF RHINE, &c. .	8	8	0
A FORTNIGHT IN SWITZERLAND . .	10	10	0
A WEEK ON THE RHINE	5	15	0
FORTNIGHTLY CRUISES TO NORWAY, by S.Y. "Midnight Sun," July 8, 22, &c.	12	12	0

Independent Tickets.

Cook's Tickets are available all over the World, either for simple journeys or the most complex tours, and give special facilities with regard to break of journey and conveyance of luggage. Holders can obtain information and advice from the Agents and Representatives of the Firm, and use of Offices for correspondence. Interpreters at the principal Stations and Seaports.

Selected Independent Tours in England, Scotland, Ireland, North and South Wales, Isle of Man, Channel Islands, Isle of Wight, &c.

Thames River Trips.

Steam and Electric Launches and House Boats for Hire.

Coaches, Landaus, &c., for Driving Parties.

Special Advantages to Holders of Cook's Tickets for insuring Baggage against Loss.
Baggage, &c., collected, stored, and forwarded.

Illustrated Programmes free on application - - -

THOS. COOK AND SON,

Ludgate Circus, LONDON, and Branches.

COUPON
PRACTICAL TEACHER
July 1905

PRINTED AND PUBLISHED BY THOMAS NELSON & SONS, PROPRIETORS, AT THE OFFICE OF "THE PRACTICAL TEACHER," 35 & 36 PATERNOSTER ROW, LONDON, E.C.